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Journal of the Society of Arts.

FRIDAY, MAY 21, 1858.

NOTICE TO MEMBERS.

As the Society's financial year closes on the 31st inst., Members whose subscriptions have not yet been paid, are particularly requested to remit the amount to the Financial Officer at their earliest convenience.

Mr. Bailey Denton has forwarded to the Secretary an invitation to any Members of the Society, interested in Agricultural Drainage, to favour him with their company at Hinxworth, on Thursday, the 27th inst. Mr. Denton says:—

"Twelve months have elapsed since a large party of agriculturists interested in drainage visited Hinxworth. The works of improvement, comprehending the drainage of about 800 acres of land, and the making of above two miles of farm roads, were then on the eve of completion. The drainage was specially interesting, owing to the varied character of the works,—which comprehended the drainage of the gault clay by close parallel work, costing £6 10s. per acre,—and the drainage of mixed soils, equally wet, by occasional drainage costing only £1 10s. per acre. Careful records have been kept of the daily rainfall, the daily quantities discharged from the outlets, the reciprocating presence of water in test-holes, the barometric changes and influences, and the temperature of the soil at different depths. These have all been printed and published, and they prove conclusively the permeability of drained clay soils. The object at present aimed at, in soliciting the favour of another inspection, is to enable all persons interested in the matter to trace the effects now that the drained lands are cultivated and cropped,—and every means will be afforded visitors of judging of the pecuniary profit attending the improvements.

"The company are requested to meet at the farmhouse, with covered yard, at 11 o'clock. The Hinxworth estate is readily approached from Biggleswade, Hitchin, and Baldock."

LOCAL BOARDS—PREVIOUS EXAMINATION.

Fifty-seven Local Boards of Examiners have been formed. Returns of the Candidates who have passed the Previous Examination have been received, as follows:—

Louth	4
Wigan	6
West Hartlepool	3
Leeds (Christian Institute), No. 1.	14
Northowram	1
Portsmouth	2
Warminster	1
Banbury	2
Macclesfield	83
Newcastle-on-Tyne	3
Lymington	1
West Brompton	4

Leeds, No. 2.	10
Wakefield	4
Pembroke Dock	4
Ipswich	6
London Mechanics' Institution	8
Manchester Mechanics' Institution	32
Selby	9
Bradford	18
Halifax, No. 1.	15
Salisbury	1
Liverpool	35
Lockwood	1
Halifax (Working Men's College), No. 2.	21
York	7
Berkhampstead	19
Bristol	11
London Domestic Mission	1
Royal Polytechnic Institution	28
Birmingham, No. 1, (Messrs. Chance's Reading Room)	2
Sheerness	1
Sheffield (People's College), No. 1.	15
Sheffield (Mechanics' Institution), No. 2.	3
Blackburn	5
Crosby Hall (London) Evening Classes.	25
Windsor and Eton	10
Greenwich	1
Institutional Association of Lancashire and Cheshire	100
Lewes	2
Brighton	3

The number of Candidates who propose attending the Final Examinations is 337.

The total number of Candidates who have been examined by the Local Boards, is 1,108.

EXAMINATIONS.—PRIZES FOR 1858.

The following Prizes are offered to the Candidates, viz.:—

One First Prize of £5, and one Second Prize of £3 in each of the 26 subdivisions of the subjects of Examination.

No Prize in any subject will be awarded to a Candidate who does not obtain a Certificate of the first class therein.

The Prizes will be given in money or in books, at the option of the Candidate.

The following Prizes are offered to the Local Boards, viz.:—

To the Local Board whose Candidates obtaining Certificates of the first class (not fewer than ten) bear the largest proportion to its whole number of Candidates.—One Prize of £10.

To the Local Board whose Candidates obtaining Certificates of the first class (not fewer than eight) bear the largest proportion to its whole number of Candidates.—One Prize of £8.

To the Local Board whose Candidates obtaining Certificates of the first class (not fewer than six) bear the largest proportion to its whole number of Candidates.—One Prize of £6.

To the Local Board whose Candidates obtaining Certificates of the first class (not fewer than four) bear the largest proportion to its whole number of Candidates.—One Prize of £4.

No Local Board can receive more than one of these Prizes.

These sums may be applied by the Local Boards to the payment of the expenses of the

Examination, or otherwise, as the Board may deem best, for the promotion of the objects for which it was instituted.

EXTRA MEETING.

FRIDAY, MAY 14TH, 1858.

An Extra Meeting was held on Friday, the 14th inst., the Right Honourable Lord Ebury in the chair.

The paper read was :—

ON THE PLAN SUGGESTED BY THE GOVERNMENT COMMISSIONERS FOR DISPOSING OF THE METROPOLITAN SEWAGE.

By T. BAKER.

Apart from the ever rolling sea of politics, there is no subject which has of late so universally engaged public attention as the disposal of the Sewage of London, and the purification of the Thames.

The advancement of the science of preventive medicine has afforded abundant evidence that the health of every individual is greatly dependent on the sanitary conditions with which the locality, and the home, may be surrounded; and the rapid ravages of cholera, introduced by the various epidemic seasons which have prevailed in this country since 1832, have rendered more palpable to the eye of the inexperienced, that which the silent devastations of typhus had long before made clear to the enlightened physician, viz.,—that very much of the disease under which the population suffer, especially among the classes at the base of the social scale, is not only preventible, but easily preventible by the most simple means,—expressed in that important word, **CLEANLINESS**.

This has been repeatedly insisted on by Dr. Southwood Smith, the great promoter of sanitary reform in this country, and one of the Commissioners whose report I am about to introduce to the notice of this practically important Society.

It has been remarked that ideas in England are slow in taking hold on the public mind: but as soon as it had been made generally apparent that pollution freely thrown into the fluids from which solids are formed, must, in the nature of things, create pollution in the solids so formed,—that poisoned air and poisoned water cannot fail to poison the animal system into which they are absorbed,—it was taken for granted by the legislature, the people, and the ratepayers, that the necessity for removing the manifestly prolific sources of misery, arising from the foul emanations of the London sewers, and the river into which they are discharged, had been demonstrated.

Now, if ideas be slow of development in the English mind, action is slower still: and so the engineering talent of this great country has been for the last ten years engaged in the discussion of various plans for getting rid of the filth which lies at our doors.

To the mind of the philanthropist it would seem, that if there be one subject more than another, on which all personal feeling may be laid aside; all professional jealousy put to sleep; and all consideration of pecuniary gain, or even scientific reputation foregone; it might be this national, all-prevailing question of public health:—that the one idea kept in view by the disputants should be, what is the best mode of attaining the common object for the common weal? without a thought as to who should execute the work—or whose should be the merit of originating the chosen plan.

Surely it would be preposterous to imagine that in Britain—the birthplace of the steam-engine, the railroad,

the *Leviathan*, and the electric telegraph—there can be any real practical engineering difficulty in this latter half of the nineteenth century, in thoroughly draining even the metropolis of the world, or in carrying the refuse to any distance where it may be safely disposed of. Yet we are still hammering at the plan!

EXISTING SEWERAGE AND PROPOSED PLANS.

The existing main sewers, north of the Thames, are four in number, independently of Hackney Brook, which falls into the river Lea:—1. The Ranelagh Sewer, running from Hampstead, through Kensington, to Chelsea, where it discharges its contents into the river, near the Royal Hospital. 2. The King's Scholar's Pond Sewer, also from Hampstead, a little more to the east, following the line of St. John's-wood, and the Grosvenor district, falling into the Thames at Pimlico, near Vauxhall-bridge. 3. The Fleet, from the west of Highbury, through St. Pancras, King's-cross, and Clerkenwell, to Blackfriars. 4. Walbrook Sewer, from Hornsey to the City, by the Bank and London bridge. These main sewers receive the surface and house drainage from all the districts to the east and west of them respectively. On the south side are the Effra Sewer, and some others. To relieve the Thames from these foul discharges is the problem to be solved.

A description of all the plans which have from time to time appeared for this purpose, would occupy several volumes, upwards of 150 having been submitted on one occasion. This, therefore, will not be attempted; but I propose shortly to glance at the principal schemes that have been laid down. These are—

1. Simply to intercept the sewage from falling into the Thames, near London, conveying it into, or near the sea.
2. To utilize and make profitable the sewage, which has been intercepted, by the irrigation of meadow land with the water, holding the deodorized refuse in suspension.
3. To purify the river itself, independently of the sewage.
4. Lastly, the plan which has just appeared, under the auspices of the Royal Commission, for combining the two latter objects with the general adornment of the Thames; and the relief of the streets from superabundant traffic.

INTERCEPTING MAIN SCHEME.

The great intercepting main plan, now so long before the public, with which the name of Mr. Frank Forster has usually been connected, as the proposer, was based upon the labours of Mr. Roe, and other engineers, previously in the service of the Commissioners of Sewers. This plan has been further modified by Messrs. Haywood and Bazalgette.

The matured scheme of the latter gentleman, proposed to construct three large mains at different levels, running parallel with each other, in the lines of Camden Town, the New-road, and Fleet-street, respectively, and terminating in a large reservoir at West Ham,—the sewage of the south side having its termination at Greenwich,—before reaching the final outfall at Barking Creek; from the lowest of which mains, the sewage would require to be raised by pumping. Besides the three intercepting mains on the north, and one on the south side, on the Brixton line, special provision was to be made for the western and lower southern districts; the sewage being deodorized, so as to allow the water, after the organic matter had been precipitated, to flow into the river, and the solid residuum sold for manure. For this purpose large reservoirs were to be provided, into which the sewage would require to be pumped by steam-engines, preparatory to the work of deodorization.

It is important to observe, that the principle of pumping and of deodorization, allowing the purified water to flow into the river, was here fully conceded; but this was not the first time that a system of pumping had been pro-

posed, for as early as 1848-9, Mr. Austin had recommended the formation of district stations, from which the whole of the sewage might be pumped into the suburbs for agricultural purposes.

There have not been wanting practical men of opinion, that this scheme of Mr. Austin's was feasible, and that it would have proved not only cheap in comparison with the intercepting tunnel plans, but even more effectual: and it has been thought, by some persons, that the use of a new and ugly word mainly contributed to the popular disfavour with which this plan was received. Mr. Austin had designated his proposed receptacles "sumps,"—a mining term, suggested by a celebrated geologist, who was one of the Commissioners of Sewers at that time. What was meant by "sumps?" We had never been accustomed to the sound of "sumps." A "sump," especially when connected with sewage, could only be something horrid and disgusting. Why were such nuisances to be forced upon the people? The very idea became odious! The proposition was deemed a positive injury, and the scheme was consequently hooted down, to be partially revived, as we have seen, some five years later;—with this difference, that the reservoirs were to be above, instead of underground.

There has been, from time to time, considerable discussion as to the sizes of the sewers best calculated to secure the proper drainage of houses, and, at the same time, provide for occasional storm-waters being carried off without inconvenience. This question has caused much delay, but need not be entered upon at present.

Soon after the passing of the Metropolitan Local Management Act, in 1855, the general plan of interception was revived by Mr. Bazalgette, and adopted by the Metropolitan Board of Works; but, after revision by Captain Burstall, (who advised the river at Erith as the outfall, in lieu of Barking Creek), was finally rejected by H.M. First Commissioner of Public Works, who referred the plan to Capt. Galton and Messrs. Simpson and Blackwell, with special reference to the proposed outfall at Erith.

These gentlemen have reported against the outfall adopted by the Board, and recommended the construction of channels on both sides of the river, together about 47 miles in length, chiefly open, but partly covered, for the purpose of carrying the sewage to Sea Reach, near the mouth of the Thames.

The estimated cost of the intercepting sewers recommended by this plan is upwards of two millions and a quarter, and of the continuing channels to Sea Reach, upwards of three millions and a half; together about six millions,—from which no return whatever is to be looked for.

This plan of the Referees, on being submitted to the Metropolitan Board of Works, was itself referred by that body to two other engineers, who have just reported that in their opinion the proposed works would cost full eleven millions;—and suggested other modifications in the scheme of Mr. Bazalgette.

UTILISATION OF THE SEWAGE.

Among the proposals for turning the sewage of London to a profitable use, in addition to those already mentioned, a scheme, propounded several years ago by Mr. McLean, for taking such of the contents of the sewers as might not be purchased for manure from West Ham into the river Crouch, near to the sea, was, about two years since, supported by Sir Morton Peto, who offered to find the necessary capital, and to execute the works, on condition that 4 per cent. per annum on £600,000 were guaranteed to him by Government, he being at liberty to dispose of the sewage at any points of its course for distribution over the lands;—and it was calculated that in a short time, though, perhaps, not at first, very little, if any, of this manure would be allowed to reach the Crouch.

Meantime, so much difficulty had been felt, not only in London, but in different towns throughout the country, as to the increased pollution of rivers where systematic

drainage works had been carried out, that soon after this proposition of Sir Morton Peto's had been made, the Government appointed a Royal Commission to examine whether the assertions of the economists were well founded, viz.,—that town sewage is valuable as manure, and that, therefore, to spend an enormous sum to throw it away would be committing a double waste.

The Engineering Referees appointed by the First Commissioner of Works, were instructed to put themselves in communication with the Sewage Commissioners, but the former having advanced their inquiries on the plan, while the latter body had scarcely commenced its labours, the Engineers thought fit to offer their own opinion against any attempt to turn the metropolitan sewage to account, whilst the Commissioners, who have now presented a preliminary report, not only decide that town sewage is valuable; is capable of being deodorized without nuisance or injury to health; and ought, therefore, to be used instead of being thrown away; but offer a new plan for dealing with the sewage of London.

In this preliminary report we are not furnished with an estimate of the probable sum which would be realized from the sale of the metropolitan sewage as manure,—details being promised in a future report,—but the general conclusions now given, with respect to the whole subject of the disposal of the sewage of towns, are as follows:—

"1st. That the increasing pollution of the rivers and streams of the country is an evil of national importance, which urgently demands the application of remedial measures; that the discharge of sewage and of the noxious refuse of factories into them is a source of nuisance and danger to health; that it acts injuriously not only on the locality where it occurs, but also on the population of the districts through which the polluted rivers flow; that it poisons the water, which in many cases forms the sole supply of the population for all purposes, including drinking; that it destroys the fish; and generally that it impairs the value and the natural advantages derived from rivers and streams of water.

"2nd. That this evil has largely increased with the growing cleanliness and internal improvements of towns as regards water supply and drainage; that its increase will continue to be in direct proportion to such improvements; and that as these improvements are yet very partial, the nuisance of sewage, already very sensibly felt, is extremely slight as compared to what it will become when sewage and drainage works have been carried into full effect.

"3rd. That in many towns measures for improved water supply and drainage are retarded, from the difficulties of disposing of the increased sewage which results from them; that the law which regulates the rights of outfall is in an anomalous and undefined condition; that judicial decisions of a conflicting character have been arrived at in different instances; and that consequently the authorities of towns have constantly before them the fear of harassing litigation.

"4th. That the methods which have been adopted with the view of dealing with sewage are of two kinds; the one being the application of the whole sewage to land; and the other, that of treating it by chemical processes, to separate its most offensive portions; that the direct application of sewage to land favourably situated, if judiciously carried out, and confined to a suitable area exclusively grass, is profitable to the person so employing it; that where the conditions are unfavourable, a small payment on the part of the local authorities will restore the balance.

"5th. That this method of sewage application, conducted with moderate care, is not productive of nuisance or injury to health.

"6th. That when circumstances prevent the disposal of sewage by direct application to land, the processes of precipitation will greatly ameliorate, and practically obviate the evils of sewage outfalls, especially where there are large rivers for the discharge of the liquid; that such

methods of treating sewage do not retain more than a comparatively small portion of the fertilizing matter, and that although in some cases the sale of the manure may repay the cost of production, they are not likely to be successful as private speculations.

"7th. That considered merely as the means of mitigating a nuisance, these precipitating processes are satisfactory; that the cost of them in any case is such as town populations may reasonably be called upon to meet; that the necessary works need not, if properly conducted, be a source of nuisance; and that, by modifications of the existing methods, even the slightest risk of nuisance may be entirely obviated.

"8th. That the employment of the one or other method of disposing of sewage, or of both conjoined, must depend upon locality, levels, markets, and a variety of other circumstances, and that the case of each town must be considered upon its own peculiarities.

"9th. That there is good ground for believing that the methods yet proposed for dealing with sewage are not the best that can be devised, and that further investigation will probably result in the discovery of processes more thoroughly equal to the suppression of the nuisance, and at the same time calculated to give more valuable products.

"10th. That the magnitude of a town presents no real difficulty to the effectual treatment of its sewage, provided it be considered as a collection of smaller towns."

I believe that it has been proved in several of our cavalry barracks, and by dairymen, that the best disinfectant for stables, cowsheds, and piggeries, at the same time greatly improving the health of the cattle where used, is a powder manufactured by Mr. McDougal, of Manchester, a paper on which was recently discussed by this Society. If this powder has not yet been brought under the notice of the Commissioners, it may be worth a trial, if not for the precipitation of the sewage, at least for the defecation of the solid portions of the manure, of which it much increases the value by fixing the ammonia.

PURIFICATION OF THE THAMES.

With regard to the purification of the River Thames, independently of the continued discharge of sewage into the stream, a valuable report, by Mr. Goldsworthy Gurney, was printed, by order of the House of Commons, in December last. In this report it was shown that the solid matters of sewage, being considerably heavier than water, sink at the rate of about a foot per minute in still water or slow currents—and that they will also precipitate in stronger currents, even up to the rate of 170 feet per minute; but, when the current runs above this rate, the sewage is kept in a state of mechanical admixture with the water. Consequently, sewage will deposit at all times of the tide along the banks, where the current is always sufficiently slack; although, in the middle of the stream, while the tide is running full, such portions as have not already sunk will continue suspended in a mixed state. When the tide is not running it sinks in all parts. It follows that immense deposits of sewage and foul matter are retained in the mud banks along shore—the accumulations of centuries, and that these deposits can never be removed by the tidal influence. Eddies along shore, produced by the opposition of the feshet, down the river to the flow of the tide, and running upwards at the ebb, would prevent this, even were the foul matter in a state of admixture with the water.

"The tide," says Mr. Gurney, "off the terrace at the Houses of Parliament, runs at an average rate of from three to four miles per hour in the middle of the stream; towards the sides its rate is considerably less; within eight yards of the shore it never runs at a rate exceeding 78 feet per minute; nearer to the shore it generally falls into a slack—at from two to four yards off the shore, the tide is either still or takes an opposite direction; when the stream runs up, the eddies run down; when the

stream runs down, the eddies run up; as is the case in all tidal rivers. Between these currents the natural water brattice is formed, with a series of recesses, or little cesspools running along shore." Mr. Gurney explains that the water brattice is the still line which divides two retrograde or opposite parallel currents. "Within these brattices a large quantity of sewage is always precipitated and permanently retained. On looking along the river, two black lines may generally be seen stretching along the sides; these black lines are the series of cesspools just adverted to, filled with sewage."

As a natural consequence, it was found, by careful experiment, that the water at the sides was at all times more than five times as foul as that taken from the middle of the stream.

Again, Mr. Gurney says, "in the river, at high water, about the turn of tide, there is a notable period in which the water is still, or nearly so, for about 10 or 20 minutes. The sewage will then fall about the rate of a foot per minute, and if it continues for 10 or 20 minutes, the sewage will fall as many feet; at this depth it will reach the bottom in many places. After the tide has turned, and the slow current commenced, the sewage will still continue to sink in the slack, retrogrades, and eddies along shore, where it will remain until the turn of tide. A large portion on the flow will be stirred up and carried back again by the upcast."

He proceeds to point out that the quantity of foul deposit retained in the Thames is nearly constant, being governed by the size of the slack and retrograde currents; that the sewage, if discharged into the river at all, no matter how far down, would be brought back by the upcast; and that if the retrograde currents be not destroyed, it will be retained in the stream in large quantities. But if the retrogrades are destroyed, the sewage will not be so retained, as in all tidal rivers where there is no room at the sides for slacks or retrogrades to form there is no deposit; and he recommends—

"That all the retrogrades and brattice cesspools be destroyed.

"That all obstructions to a uniform flow of the river, at low water, be removed.

"That the projections along shore be rounded off, and the hollows filled up.

"That the serrated edges of the river at low water be made plain, and continued along the whole line of low water mark.

"That the width of the whole water-way, when the tide is at its lowest ebb, be not more than 140 yards from side to side; so that the river may run, not only in a uniform current, but at a rate of not less than 225 feet per minute."

He adds, that by these means, "the navigation of the river would be improved."

Mr. Gurney observes, in conclusion, "that the above recommendations do not interfere with any vested interests, or affect the navigation of the river, [while the works are in progress], and, therefore, may be carried out at once."

PLAN OF THE ROYAL COMMISSIONERS.

We arrive at length at the plan just promulgated by the Royal Commissioners, the novelty of which consists in turning to account facilities afforded by one necessary work for executing a second, and not less important undertaking;—thus concentrating into one grand scheme various propositions which, separately, could not have been carried into operation without very much greater difficulty and expense; whilst it may also lay claim to that candour which is willing to adopt whatever of good may be found in the plans which have from time to time been launched, in attempting the solution of that most desirable consummation, the effectual drainage of London, in combination with the effectual purification of the Thames.

The Commissioners, whose preliminary report is dated 26th March, 1858, propose to collect the sewage in intercepting reservoirs, constructed at the present outfalls along the river banks, and these reservoirs, being chambers formed in the embankment walls about to be described, everything in connection with them will be quite out of sight. Each receptacle will continue to form, as it were, the outfall of a separate town, at which the work of deodorization, pumping, &c., will be carried on independently of the others.

The present sewers, which, small and large, extend to above a thousand miles in length, will remain undisturbed; only that a few intersecting mains for the higher, and collecting mains for the lower, levels, will be required for conducting the sewage into the reservoirs. The purified water, all organic matter having been first precipitated by the most improved chemical means, will be allowed to flow into the river—as proposed by various persons, and amongst others by Messrs. Haywood and Bazalgette, in 1852, for the western district—and the thick slimy residuum, pumped either into the rural suburbs for manure, or to the sea, whither it may even be removed daily in barges, should the demands of the gardeners and farmers be unequal to the supply. In this manner the questions of drainage, and application of the sewage to agricultural uses, are disposed of: and the Commissioners show that there can be no foundation for any apprehension of nuisance arising from the sewage, or the works.

In corroboration of this opinion there is appended to the report of the Engineers recently consulted by the Metropolitan Board of Works, and published almost simultaneously with the report of the Royal Commissioners, a letter from Dr. Letheby, the City Medical Officer of Health, to which my attention has been called since this paper was first written. Dr. Letheby says:—"By the action of lime on sewage, the sulphuretted hydrogen and carbonic acid are fixed, as well as a small portion of the soluble organic matter, forming a precipitate, which contains carbonate of lime and the insoluble matters of the sewage. This precipitate is in a flocculent form, and it rapidly subsides, leaving a clear liquor, which is nearly deprived of odour.

"I am quite sure that the process of defecating the sewage of London, by means of lime, may be effected with advantage and perfect safety, and that the discharge of the clear sewage water into the Thames will not be a source of danger or discomfort to the public."

On the plan of the Royal Commissioners, the areas for constructing the large reservoirs are to be provided by the adoption of a modification of Mr. Page's scheme for embanking the Thames, recommended by the Metropolitan Improvement Commissioners in their report of 1844. This will also secure the object of Mr. Gurney, who confined his attention to the improvement of the river bed, as also that of Mr. Walker, who proposed a solid embankment, to a uniform line, having recesses for the barges.

Mr. Page's proposal for the river embankment, as is well known, is to construct advanced terraces on each side, from Chelsea nearly to London Bridge, so as to confine the stream to an almost uniform width—about the same as it is at present between London and Southwark Bridges. These terraces will be from 6 to 10 feet above high water mark, and will communicate with the existing banks by roadways, and from some of the bridges underneath which the terraces will pass. Where there are no wharfs the spaces between the terraces and the shore will be filled in solid; affording space for gardens, as at Chelsea, Whitehall, Somerset-house, and the Temple.

The plan of this embankment is appended to the Report of the Royal Commissioners, who propose that the reservoirs for collecting and purifying the sewage shall be formed by internal chambers, 22 feet wide, in the terrace embankments themselves, so that no land will have to be purchased. Between the embankment

walls and the wharfs there will be permanent docks or basins,—which may be entered both at half and full tide,—so that the accommodation at the wharfs will be much increased, whilst the narrowing of the river channel within the straight uninterrupted walls will considerably improve the navigation; and, lastly, the width of the terraces being 56 feet, facility will be afforded for the construction of carriage ways and railroads along the whole line, connecting, as it were, every suburb of the Metropolis at one common centre. There will be a few reservoirs placed in portions of solid embankment, at such outfalls as may also be necessary above Chelsea, and below London-bridge; besides similar works at the mouth of Hackney Brook.

The very moderate estimate for this stupendous undertaking, including the embankments and roads on both sides of the river, and all the necessary reservoirs and apparatus, is three millions and a quarter—being little more than half the outlay required for the scheme of the three Referees, for drainage alone, according to their own calculation, and not one-third on the estimate of their critics.

The importance of this work is admitted by the Engineers of the Metropolitan Board of Works, who in addition to their recent modification of Mr. Bazalgette's drainage plan (6th April, 1858), recommend the embankment of the Thames as a separate undertaking necessary for the purification of the stream; this advice being founded upon the opinion of Dr. Letheby, who writes, (15th March, 1858) "As to the proposition for embanking the Thames and narrowing the channel, so as to scour the bed, I believe it to be the most effective means of improving the condition of the river, and of protecting the public health; for the removal of the offensive mud, and the submerging of the river's banks, are, in my opinion, the most important of all considerations."

This comprehensive scheme of the Royal Commissioners for intercepting and disposing of the London sewage possesses one great advantage over all the other drainage plans, viz., that the ratepayers will not only have, but will see that they have something for their money; something, too, far superior to the improvements, grand as they are, now going on in Paris by direction of the French Emperor. Moreover, it may be urged that Government might fairly be expected to contribute towards the Thames embankment, this being a truly national work,—and pronounced absolutely necessary for the improvement of the river navigation, as well as the sanitative preservation of our great legislative bodies, by Mr. Gurney,—who is supported in his opinion by Messrs. Walker and Page, by the engineers of the Metropolitan Board of Works, and by Dr. Letheby.

Such is the plan suggested by the Royal Commissioners for disposing of the Metropolitan Sewage: a project which seemed to me to be so important, in a national point of view, as to demand the immediate attention of the scientific and philanthropic men who are accustomed to congregate in this hall; and the Council of the Society, with the urbanity for which they are distinguished, as soon as the matter was named to them, set apart this special night for the discussion.

It may, I think, be safely affirmed that no vested interests will be injuriously affected by the proposed river embankment. Seeing, however, the great propensity which exists in this country for setting up private against public interests, and the leaning of juries towards the individual against the mass,—whereby selfish men are often tempted to prefer claims to be exorbitantly compensated for temporary inconvenience, at the public expense,—it may be well to obtain power of purchasing any property along the line of works, relative to which differences may arise, the price to be settled by arbitration; the expense of such arbitration to be borne between the parties in an inverse proportion to the nearness of the award to the sums offered, and claimed, respectively. It is well-known that men will endure in-

mense temporary inconvenience and suspension of business in carrying out private improvements, for prospective advantages,—whilst, the moment that equal private advantage is promised by a public improvement, at much smaller present sacrifice to them, they will demand enormous compensation for alleged loss.

Let us, however, indulge in the hope that, if the plan now proposed by the Commissioners be found by impartial practical men to be effectual for all the purposes proposed,—and it is difficult to perceive any valid objection to it,—and, at the same time, calculated largely to contribute towards the convenience and adornment of this great metropolis, and, above all, to the health and enjoyment of its millions of inhabitants;—let us, I say, hope that no spirit of petty jealousy on the part of professional men; no mean parsimony on the part of financiers or rate-payers; no grasping avarice on the part of vested interests;—will be allowed to interfere with its cheerful, speedy, and thorough execution.

DISCUSSION.

The CHAIRMAN said Mr. Baker had commenced his paper with the remark that, apart from the ever rolling sea of politics, the subject which they were now met to discuss engaged, perhaps, the largest share of public attention and interest. He felt the truth of that remark, and was himself an illustration of it, for he had that evening quitted an unusually interesting debate in the House of Lords for the purpose of attending this meeting. It was true that the pleasure which the meeting afforded him was one inducement, but the great reason was the interest which he himself felt in the subject before them. He would first touch upon the steps that had been previously taken in reference to this matter, and then offer a remark or two upon the proposal which had recently been put forward by the Royal Commissioners, and which had been detailed by Mr. Baker. Now, the Metropolitan Board of Works had been, he believed, a good deal blamed for not having as yet proposed a scheme which was satisfactory, for the purpose of disposing of the sewage of the metropolis. Indeed, Mr. Baker himself had blamed—he would not say the Metropolitan Board only—but all parties alike, in that they had arrived at the year 1858 and were still “hammering at” the measure which, eventually he hoped would be completely hammered out. He (the Chairman) did not think that blame was justly deserved by anybody—certainly not by the Metropolitan Board of Works. We ought to recollect the position they were in. What did this Report of the Royal Commissioners say on the subject? It was a most able Report. He never read a Report with more satisfaction; it was liberal, and not tainted with prejudices of any kind. Wherever difficulties arose a fair confession of those difficulties was made; and where they could do so they made suggestions by which these difficulties might be overcome. What did the Royal Commissioners tell them? They told them this most important fact, that these difficulties had only come upon us of late years. All that the old Commissioners of Sewers had to do, was not to take away the refuse of London and dispose of it, but to prevent people from draining into the sewers. It was only in recent times that we had had to deal with the difficulties with which we were now surrounded. Therefore no board or boards were to be blamed if they could not all at once provide a plan to meet the increasing necessities of the case. He was not himself a member of the Metropolitan Board, although he had had a considerable share in the preparation of the act, but it must be remembered that this board was preceded by two or three other boards, and he could not say that what they proposed was more feasible than that which had been put forward since. He must say that the plan of expending several millions of money in carrying the sewage away to be thrown into the sea was a satire upon the age in which we lived, and

therefore he would not touch upon that subject, for he did not think it would for a moment enter into the calculation of those who listened to him. He would briefly proceed to notice the plan proposed by the Royal Commissioners. There was one important subject which had been touched upon in the report, namely, the state of pollution at which rivers generally had arrived—(not the Thames only)—partly from the sewage and partly from the residuum of manufactures thrown into the water. Now, Sir Benjamin Hall and himself had strenuously endeavoured to introduce into the Removal of Nuisances Act a clause to prohibit persons engaged in manufactures from disposing of the residuum by discharging it into rivers, unless they had used the best known means to prevent such residuum from polluting the water, but owing to the influence of powerful interests in the legislature they were defeated, and were compelled, after several divisions, to give up the clause. It was remarkable how much pleasure and exercise was afforded the poorer classes by the banks of a river. There was always something of interest going on—and if they went down the Thames on a fine day they would find the little public nooks leading down to the river's edge crowded with human beings. This was one reason why the plan before them, involving as it did the improvement of the river, strongly recommended itself to his mind. Then again, they had to deal with the continually increasing traffic of the streets of London, which was becoming almost intolerable. The amount of the traffic was so great, and the streets were so enumbered by those immense vans which rapidly injured the roadway, besides obstructing the thoroughfares, that this had a serious effect upon the amount demanded from the rate-payers for repairs; and he thought that, although they would have to pay heavily for the embankment of the Thames, the relief thus afforded to the traffic would effect an important saving in the rates, which should not be lost sight of. At the same time we were bound manfully and honourably to look the difficulties of the scheme in the face, and to note the disadvantages as well as the advantages. The disadvantage which principally struck him was this. They had in this scheme to deal with the difficult subject of the sewers themselves, which it was proposed to place within this embankment, and it was not stated whether the three and a-half millions estimated cost included these sewage works. There could be no doubt that a very large amount of valuable fertilising material could be precipitated by chemical means, and that as far as that went the problem was solved. If they could get the sludge separated from the water, the latter might be safely discharged into the river without being productive of any evil at all, for, even in the present day, it had not been proved that the discharge of sewage into the river had had any seriously bad effect upon the health of persons living in houses where proper attention was paid to ventilation. It was only the very poorest classes dwelling in wretched and ill-ventilated tenements, who suffered from the malaria generated from the deleterious substances discharged into the river. The great difficulty was, how to deal with the sludge. Two or three different plans might be suggested. They might follow that adopted at Leicester and other places. It might be desiccated and disposed of as manure. This was, he thought, the simplest process of all, but, he could not say whether or not it was wholly unattended with nuisance. The Commissioners had stated that the sewage might be taken away in barges, or pumped up to certain districts where market gardeners and others would like to have it; but they had not given any estimate of the expense of steam power, or other necessary details. It was exceedingly necessary for those to whom the carrying out of this measure would be entrusted, to consider what would be the effect upon the river itself of confining it within new and narrower banks. Serious evils had resulted at Chester, a city with which he had formerly been closely connected. The embankment of the

river there was undertaken, and most favourable effects had been expected from it, but the result had been that the mouth of the river had silted up to such an extent, that now they were not able to get ships up to Chester except at very high tides. If the flow of the tide was impeded and a smaller amount of water was carried up the channel, the scour would be diminished to an equal extent. This would, however, be to some extent modified in the plan proposed, by having arches to admit the water into the docks where the barges could remain, and, therefore, perhaps what he had said was scarcely an argument against the plan of the Royal Commissioners. The **sewage** had become a serious evil in the present day, and in process of time would become still greater, and would be attended with more danger, and the safety of the population was a matter to be most carefully considered. It was his great desire to see places of healthful recreation provided for the toiling thousands pent up in cities, and he should indeed regard it as a halcyon day when the working people of this great metropolis should have abundant opportunity for open air exercise and recreation, and to promote that end he would do all in his power. Although he was a member of this Society, he was prevented from attending the meetings as often as he could desire, but he thought that the managers of it deserved well at the hands of their fellow countrymen, for having afforded facilities for the discussion of this interesting and highly important subject.

Mr. LAWRENCE PALK, M.P., said this was a question in which he had taken considerable interest, and perhaps he might be allowed to say a word or two upon it. He had read the report which had been so much alluded to that evening, and he must say a more excellent report he had never perused. He did not mean to say that with regard to some of the conclusions there might not be some doubt, but upon the whole he thought it had put the question of getting rid of the sewage of towns upon a more practical footing than it had ever been on before. The principle which predominated in that report was that of getting rid of the liquid sewage of towns by a system of irrigation of meadows, as practised with great success in the neighbourhood of Edinburgh, but there, as they would perceive by the report, complaint was made that a nuisance occasionally arose from the deposit of the sewage in the open ditches. The system of irrigation was by no means new in Devonshire, and, in fact, was almost peculiar to that county. They had had for many years a system of irrigating the meadows there by the springs that rose from the sides of the hills, the result of which, as regarded the crops, had been found to be extremely beneficial. The hon. gentlemen proceeded to read a letter which he had received from Mr. Campbell, of Rugby, detailing the results of some experiments he had made in irrigating with sewage water. Judging from the conclusions arrived at by the writer of that letter, it would seem that the irrigation of land with sewage might be carried on with profit to the town and with great benefit to the agricultural districts. The other leading feature of the report of the Royal Commissioners was the chemical deodorisation of the sewage by the means with which they were already acquainted. Being very anxious to test that plan by actual experience, he went to Leicester and witnessed the entire process under Mr. Wickstead's system,* and he could speak with the greatest confidence of its perfect success. He saw the process through all its stages, and he did not notice any particularly offensive smell; indeed the smell was not of a character to satisfy the critical senses of the agriculturists of the district in that respect. He was told that the lime used for precipitating the solid matters acted injuriously upon the fertilising properties of the manure, and that unless some means of fixing the ammonia were adopted, it would not be found of sufficient value to be really profitable. He thought

this was a question which was well worthy the attention not only of gentlemen connected with large towns, but also of those who, like himself, were connected with the agricultural interests of the country. If they looked to the increasing value of guano, and the difficulty there was in obtaining it pure, he thought it was important that science should be brought to bear, in order to retain for the use of the agricultural districts that which was the bane of large towns, but which was of such extreme value to the farmer. He therefore hoped that those in whose hands this great question was, would consider well before they sanctioned any plan which should pour into the sea as useless a material which might be made to be a great blessing to the country at large.

Mr. HAYWOOD said they were called together to discuss the plans proposed by the Royal Commissioners for disposing of the sewage of the metropolis. Before entering upon those plans, he would look for a moment at the conclusions which the Commissioners had arrived at, and which were stated in their report, and quoted in Mr. Baker's paper. That commission was appointed in January, 1857, and, after sitting for 12 or 15 months, it had arrived at nine certainly very satisfactory conclusions, and these conclusions had, doubtless, acquired considerable additional importance from having received the assent of that commission; but every one of them had been arrived at before by practical men who had carefully considered the question. There was not a single point of novelty in any one of these nine conclusions. The most important of them, perhaps, was the fourth, in which the Commissioners admitted that, after examining nearly all the places in the country where irrigation by sewage water was practised, their opinion was that, excepting under very favourable circumstances, it would not pay. That was a most important point. There was no novelty in it, but it would derive greater force by being promulgated through the authority of this blue book. The next conclusion was also an important one, as bearing upon the subsequent scheme, viz., that works for precipitating sewage matter might be erected in the vicinity of towns without inconvenience to the inhabitants; with that he quite agreed. The tenth conclusion required some explanation, as at present it was put in a very doubtful shape. With regard to the scheme itself, it was necessary that they should have it really before them before they could discuss it, but the report merely gave an outline—an idea of a scheme. It told them, in the first place, that sewage might be dealt with without fear of harm to the inhabitants of the city, and, secondly, that if the Thames embankment were carried out, the sewage works could be made upon that embankment. That, in fact, comprised the whole of the scheme now propounded, and, as such, he was quite unable to discuss it. There was an entire absence of all detail by which the probable cost might be estimated. They were quite left in the dark as to the number of the works, and as to their situation, because, he maintained, that there must be works established far beyond the line of embankment proposed in this scheme. He thought it was a fallacy to think of treating this question of the embankment of the Thames unless they were prepared to treat also of the question of compensating the persons who held property on the Thames. Parliament would never entertain a scheme, apart from compensation to the owners of the property which would be affected by the plan; and this would form a fearful item in the cost of the embankment. In the paper of Mr. Baker comparison had been made between the cost of this scheme of the Royal Commissioners and that proposed by Mr. Bazalgette, and partly by himself, which would be considerably increased if the suggestions of the government referees were to be attended to. It was useless to attempt to make a comparison between a scheme of which they had the whole of the details, and that of which they possessed none; but he must say this, that in every plan for the intercepting of the sewage, the

* See *Journal*, Vol. V., page 49.

question of the improvement of the arterial drainage must form an integral part. If this plan of the Commission was merely a question of taking up the sewage at its outlet, the estimates would then be formed upon entirely different premises, and no fair comparison could be made between them. The scheme of the Royal Commissioners was at present but a mere shadow, and as yet nothing had been put forward which could enable practical men to judge of its merits or demerits.

Dr. BARNES observed, that although the author had appeared in his paper to the "enlightened physician," he (Dr. Barnes) could not but feel that throughout the main-drainage controversy the medical propositions, which formed the very basis of all drainage schemes, had been taken for granted. The evidence of medical observers, who alone were competent to solve the fundamental question as to the effect of the Thames upon the health of the metropolis, had never been taken. The engineer and the chemist could not properly be called upon to produce plans and remedy an evil before the evil was proved to exist. He asked where were the proofs of the prejudicial influence of the Thames upon health? The opinions of Mr. Burk, of Dr. McWilliam—he might say of all those who had enjoyed special opportunities of observing the sanitary relations of the Thames, coincided with his own—that the Thames population was remarkably healthy. Fever and diarrhoea were less prevalent amongst those living near the river than amongst those at a distance from it. He must also insist that the principle of concentrating sewage in gigantic drains was radically wrong. The right principle was the very opposite one—to subdivide the sewage as much as possible. Mr. Haywood had shown the insurmountable difficulties in ventilating the sewers even in their present comparative simplicity, and surely this difficulty would be enormously increased by collecting the sewage into main-drains. We should be subject to the reflux of sewage gases into our houses with tenfold greater virulence. Mr. Goldsworthy Gurney's report had been much referred to, but he (Dr. Barnes) felt bound to point out that it displayed such misapprehension of some of the first principles of chemistry, that it ought to be read with caution. His opinion that sewage gases were propagated solely by virtue of the law of the diffusion of gases was directly at variance with observation. The sewage gases escaped into the streets and houses under the immediate action of currents, the force of which was demonstrable by the anemometer. In referring to the scheme of the Royal Commissioners, Dr. Barnes said it had been truly pointed out by Mr. Haywood that no complete plan had been presented by them. He was at first much disposed to agree with that report, but the difficulties urged by Lord Ebury and Mr. Haywood, now satisfied him that this report only added another argument to those he had been urging for some time past, in favour of a full and open inquiry into the whole subject, including the fundamental principles which had been overlooked altogether. At any rate, before committing the ratepayers to the execution of the plan as a whole, he advised that it should be adopted at first partially and experimentally, taking only one large sewer at a time.

Mr. HOLLAND felt with Mr. Haywood, that the plan of the Royal Commissioners was a mere sketch, and therefore we were not in a condition to do more than discuss the idea which had been propounded. Mr. Haywood had omitted to notice one very important feature in the question. The report of the Royal Commissioners started with the assumption, that the embankment of the Thames was a good thing *per se*, without any reference to the sewage question at all. If they assumed that this ought to be carried out on its own account, and was worth its cost, then Mr. Haywood's argument about that part of the cost did not hold good. He had no doubt the embankment would be a matter of enormous expense, and he was sceptical as to whether the benefits resulting from it would be equal to the cost it would involve; but

assuming this to be the case, then he thought no one could doubt that, so far as the disposal of the sewage went, this plan—if effectual—would be the cheapest that could be adopted. With regard to the question of disposing of the sewage profitably, there were various opinions upon that. He took it for granted that the sewage of London was too valuable to be thrown away; but, at the same time, he thought the expense of conducting it to where it could be brought to profitable use would be very great, and it would be difficult to persuade the public that it was worth while to incur such an expense under the idea of eventual profit. If we lived under an enlightened despotism, no doubt the thing would be carried out; but unfortunately, as regarded this question—though fortunately in other respects—the state of things in this country was very different, and therefore we must make the best we could of the matter. His impression was that they would lose so much time in persuading the public into the idea of conducting the sewage where it could be brought into profitable use, that it might be better to give this up altogether as regards London. What he disliked in this report of the Royal Commissioners was, that it seemed to imply a doubt, probably not intended, upon the profitable application of sewage matter in places where the objections which applied to the metropolis did not hold good. In most of the towns of England the sewage could be conveyed upon the land with very little expense, but London, lying at about the level of the sea, with an enormous amount of occupied land round it, presented a case of very great difficulty. The rendering of the sewage inoffensive was an easy thing enough, and was carried out perfectly at Leicester. He did not, however, agree with the hon. gentleman (Mr. Palk) that the process was entirely free from all offensive smell. At the same time the odour was not of an intolerable character, and he believed this objection might be still farther modified, if not entirely done away with. He had been told that there was some invention by which the fertilising matters might be entirely precipitated from the sewage. He had heard this as much as twenty years ago, and was told of it again within the last few weeks, but he was still, as he had ever been, sceptical on the point. He did not believe this could be done; if so, the sewage question would be at once disposed of, and all further discussion would be needless.

Mr. FREDERICK DOULTON said they were discussing a question with respect to which they had in fact no data on which to come to a conclusion. They had no tangible plan before them to discuss, but merely the outline of a plan. He thought good would result from this report, although upon the question of the disposal of the sewage the Royal Commissioners had scarcely gone further than to condemn the proceedings of former Commissioners of Sewers and Boards of Works as radically wrong. That was the conclusion they had arrived at, and he thought if they had convinced the world at large of the difficulty and uncertainty which attached to the whole question, they had done great good, although they had not put forth a plan in sufficient detail for discussion. There seemed to be an uncertainty about this which did not attach to any other question. One set of engineers had estimated the cost at one million, others equally eminent had put it down at three millions and a-half, whilst others had mentioned eleven millions. As a member of the Board of Works he did not regret, but rejoiced at the delay that had taken place on this question, and he believed that good would arise if they were not hurried into a decision on so important a subject. In his opinion, further inquiry was necessary, not only as to the necessity of diverting the sewage from the Thames, but also upon the question of the large intercepting sewers proposed. They had a very striking illustration of what might be looked for in the carrying out of the larger scheme, in the Victoria-street sewer, which was to cost £4,000 or £5,000, but which had reached, he believed, £200,000.

When they recollected that the strata through which these proposed sewers must pass were of the same character as those in which the Victoria-street sewer was formed, they had some glimpse of the difficulty and expense that might be incurred.

Mr. PITTARD said, as the Medical Officer of the London Docks, he felt great interest in the question under discussion. The water in those docks having become extremely offensive in hot weather, he sought means to effect a remedy, and with that view he paid a visit to the Tottenham Sewage Works, and witnessed the process of deodorisation carried on there. The water that was discharged had the appearance of great purity, but having had the curiosity to preserve a little of it, he found after a few days its odour became intolerable, which, he thought, proved that the impurities, although temporarily suppressed, had not been really removed. Mr. Pittard made some remarks upon the present polluted state of the Thames, which was perceptible to all who made the passage of the river; and the odour being similar to that emitted from the gully holes of the sewers, he thought there could be no doubt as to its deleterious influence on the health of the population.

Mr. ROBERT RAWLINSON said, although the report of the Royal Commissioners had been termed an outline, or sketch of a plan, this was no proof that a plan had not been matured previous to this outline having been published. He believed he might pledge himself that, at the proper time, the full scheme would be brought before this Society, when all the facts and figures would be given. He might state that the estimates in the report were not matters of guess. The details had been duly worked out, and might, he believed, be fully relied on.

Mr. NICHOLAY (who had taken the chair upon the retirement of Lord Ebury at an earlier stage of the meeting), said they had a duty to perform to Mr. Baker by expressing their acknowledgments to him for having brought this subject before them; he would, therefore, propose a vote of thanks to that gentleman.

A vote of thanks was then passed to Mr. Baker.

TWENTY-THIRD ORDINARY MEETING.

WEDNESDAY, MAY 19, 1858.

The Twenty-Third Ordinary Meeting of the One Hundred and Fourth Session was held on Wednesday, the 19th inst., J. Griffith Frith, Esq., Member of the Council, in the chair.

The following Candidates were balloted for and duly elected members of the Society:—

Crowley, Jonathan Sparrow | Cutler, George Octavius

The Paper read was—

ON THE ENGLISH SETTLEMENT OF THE HILL REGIONS OF INDIA.

By HYDE CLARKE.

The extension of English colonisation in India is a subject which has no reference to mechanics, like most of the Papers brought before the members, but it is one having an equal claim on our attention, as coming strictly within the purposes of our Society for the Protection of Arts, Manufactures, and Commerce. It is one having the stronger claim on our attention, because this is the only Society in the metropolis before which Colonial questions can be brought for discussion or investigation. This is a proud title for the Society, for it may indeed boast that it has in the century of its existence done very much for the advancement of Colonial interests, and thereby for the general prosperity of the

empire. Of all our Colonial interests, those of India, not commonly recognised as a Colony, are among the most important. Too long considered as the special province of a commercial company, India has scarcely received the notice it deserves as a constituent portion of the empire. Too long secluded by the jealousy of its administrators, and by difficulties of access—held up as a country which it was impossible for the outside Englishman to understand, and for which it was dangerous to legislate, India has been removed, as it were, from the pale of public opinion and the influence of public sympathy, until terrible events have made India the grave topic of the day. A fabric of administrative wisdom, which had received the highest praise and gained implicit confidence, has been shaken; a military system, which as it was flushed with glory and conquest, was thought to have surpassed in wisdom the Roman organisation, has exposed India to all the horrors of a barbarian invasion, and its soldiery have perished on the gallows or by the artillery of their own generals. A fearful conspiracy directed against those of our citizens and soldiers, our women and our children, who were resident in India, has by its atrocities harrowed our feelings, and excited our watchful anxiety during the vicissitudes of its crimes and its castigation. In the end we have reconquered India against our native army, by our own people, by the victories of the Lawrences, of Havelock, of Campbell, Outram, Inglis, Peel, of hero captains, and of hero soldiers—it may be said, of heroic and martyred women. What we have gained by our own hands, we can with the same help keep, and instead of governing India merely for a native soldiery and to uphold native prejudices and native vices, we may at length take a personal share in the welfare of India.

From the moment that the first English conquests were made in India, the question has naturally been entertained of the extension of English population there. This has occupied the minds of Clive, Hastings, Wellington, Munro, Bentinck, Ellenborough, Dalhousie, Canning, and, indeed, of every great statesman who has been connected with the country. Until a late period, although some may have wished for the introduction of such an element in the population, the prevalent disposition of Indian statesmen was, on various grounds, to exclude Englishmen from India. Still the question was never lost sight of, and several plans, general or partial, were brought forward for promoting such settlement.

The proposition of Sir Macdonald Stephenson, the chief pioneer of Indian railways, to connect Calcutta with the hill Sanitaria, by a branch line, was made before the revolt, and has been since supported. In support of this undertaking, I published a work on the Colonization, Defence, and Railways of our Indian Empire, in which the general system of hill settlement was laid down. The revolt breaking out suspended the railway projects, but its events afforded abundant confirmation of the justice of the system proposed, and the subject having been taken up by Dr. Archibald Campbell, the Superintendent of Darjeeling, Mr. J. Ranald Martin, the author of the standard work on the Climates of India, Sir C. E. Trevelyan, Dr. Hooker, the Himalayan traveller, Sir Macdonald Stephenson, Gen. Tremenhoe, Prof. Newman, Dr. Robert Barnes, and Prof. P. L. Simmonds, among others, and supported by the press in England and India, it had so far advanced in public opinion, that the member for Dumfries, Mr. William Ewart, felt justified in bringing it before Parliament, and, pressing the matter with energy, has obtained from the Government and the East India Company the concession of a Select Committee, which has been sitting for weeks, and has collected the most valuable evidence. What, at its first suggestion, was received as an absurd or chimerical proposition, is now acknowledged, under Mr. Ewart's auspices, as a most important measure, and in the recess it will have made such progress in India, that it will be ripe for legislation in the ensuing session of Parliament.

Such is the subject proposed to be brought before you this evening, and, thanks to this Society, this is the first public occasion, not excepting the debate in the House of Commons, which the advocates of this measure have had of fully explaining their views.

The word English "colonization" of India, although it expresses the idea meant to be conveyed, is however, open to misconstruction, and has been misconstrued, for, by attributing to it the idea of operations of emigration like those to Australia, it has been assumed that we propose to form agricultural colonies in the hills, and to send out agricultural labourers in masses. This misapprehension has been wielded as an argument against us, and as demonstrating the absurdity of our views, for want, perhaps, of better arguments against us. To avoid this misapprehension, it has been proposed to use the phrase "English Settlement in India," though it is not more precise.

It is as well to state that the advocates of the extension of English settlements in India are perfectly aware that much of the hill regions is as barren as the like districts in Switzerland or the Scotch Highlands, and they have never contemplated agricultural operations on such a site. What our supporters look for are results perfectly practicable, which are founded on experience, and are therefore the legitimate development of what has been already effected. We expect that, by placing a considerable English population, civil and military, in the healthy English climate of the hills, we shall form thereby a secure centre—not merely for the domination of India, but for its thorough civilization. While we shall have there a compact population physically and morally healthy, we shall be able to extend its influence on the plains, and, indeed, without this concentration, we feel we shall achieve but limited results from the small European population of the plains dispersed among the millions of India.

For the purposes of the investigation in which we are now engaged, we must consider India as including the neighbouring mountain regions and the northward frontier, more or less connected with it politically. This territory, so assumed, we may at once divide into two great portions, the countries of the hills and those of the plains, differing in climate, productions, and generally in physical conditions. The plains are capable of producing in abundance tropical crops, and teem with population; the hills are, to a great extent, barren, and, so far as they can be turned to account, afford the vegetable and animal productions of temperate climates, and they contain, likewise, valuable mineral deposits. The plains are generally unfavourable to European constitutions; the hills contain many sites healthy and with congenial climates. The hill regions form, therefore, the natural habitation for an imported European population.

Although factories had been earlier established, Bombay, acquired from the Portuguese in the reign of Charles II., may be considered the first English territorial possession. The terms of the charter granted by that king to the East India Company, and the institutions thereby established in the city, shew that it was contemplated to form there a settlement, like those formed at the same time in North America and the West Indies, with English laws, privileges, and institutions.* The Recorder's Court, which has merged in the Supreme Court, is an evidence of this implantation of English law in India; but, otherwise, this first attempt at settlement has borne little fruit, for the commercial and monopolising projects of the East India Company and their political exigencies long closed India to English enterprise, nor was it till of late years that these restrictions have been, by piecemeal, relaxed, and now, though the enactments are consigned to the grave, their ghosts are not laid.

* Of this early occupation some interesting details will be found in the appendix to the second volume of the Viscountess Falkland's "Chow-Chow."

In the last century, our great Indian empire was formed by conquests in the plains of Bengal and Madras, and, for the first quarter of this century, our empire was extended chiefly in the regions of the plains. Later events have made us masters of the Neilgherries and the long western coast range, have given us a domination over the mountains and table-lands of Central India, and have extended our bounds within the Himalayan system at many points, from east to west.

At first, the governors and authorities of Bombay began to seek the neighbouring mountains as an occasional refuge in the hot season; then the district of Poona became a residence more or less permanent. Slowly the Neilgherries were resorted to by invalids, and, at length, by the Madras authorities. Bengal was later in this history, because Calcutta, its chief seat, is many hundred miles from the hills. The extension of the presidency, and the formation of sub-presidencies to the west, have led to permanent establishments in the hills.

The hills were first resorted to as places of occasional and temporary retirement from the tropical heats; then a few wealthy invalids sought relief, and the advantages of the climate being acknowledged, the Indian government established the Sanitaria, and thereby laid the foundation of that system of permanent English settlement now in progress, and which it is sought to promote. These, in the first instance, were slowly and sparingly formed as depots for invalid English soldiers, but with the intention of making them permanent stations for a portion of the English force. Practically, this intention has not been fully accomplished, for Darjeeling has never had a battalion cantoned there, and the troops in the west have, the most part of their time, been engaged in the several wars in the valley of the Indus. Still, at the outbreak of the last revolt, it was from the hill stations that the freshest troops were sent for resistance to the mutineers.

These Sanitaria have been so successful as invalid stations for civilians, officers, and soldiers, that they have been adopted as a permanent institution of the armies of Bengal, Bombay, and Madras. There being many persons in easy circumstances among the civilians and officers, shopkeepers and other settlers have been induced to resort to these stations. Still they form but very small towns, although such a place as Simla may on the visit of a Governor-General have twenty thousand people flock into it.

The tea cultivation, singularly enough, has been an auxiliary to this hill colonization; for being suited to the neighbouring districts, admitting of European superintendence, and having been found successful, tea gardens are spreading in Assam, Darjeeling, Sylhet, and elsewhere in the northern regions.

The history of English settlement in the plains is brief. At Surat, Bombay, Madras, and Calcutta, an English mercantile population on a limited scale naturally grew up, and at the three latter ports has of late years become important. Throughout India the English civil and military servants of the Government, relatively few in number, are to be found. The only independent English population in the interior consists of the indigo planters, a fine body of men, of healthy habits and independent bearing, and whose healthfulness is by themselves attributed to their habit of spending much time in the open air. At the large stations are a few shopkeepers. Throughout India, from thirty to forty thousand English soldiers are dispersed. Most of the wealthier English are married to English wives, but their children are sent to the hills or to England, and India is not chosen as a permanent abode. There is a small body, however, of white descendants of the soldiers, and of Eurasians and half-castes, who are the only permanent representatives of the occupation of India by the English race, and very unfavourable representatives too. While the Mahommedans of immigrant or indigenous blood

form a seventh or sixth of the population, the Indo-English do not form a ten-thousandth part of the population of India.

The causes which have impeded English settlement in India have been—1st, the expense of transit; 2nd, climate; 3rd, legislative prohibitions; 4th, the imperfections of the governmental system, and the indifference or hostility of the administration.

As there have been very few passengers yearly to India, the rates have been high, and the accommodation for the lower classes of passengers inferior. The rates paid by the government for the conveyance of troops are, however, moderate enough, and with the flow of a regular traffic, intermediate and fore-cabin passengers could be carried at Australian rates, more particularly as there is a large mass of tonnage regularly employed in the Indian trade.

Internal transit was heretofore in a very unfavourable state, but with the late spread of river steamers and of railways, a settler can be quickly and economically conveyed to the hill regions, or the chief cities of the plains.

By the simple organisation of an emigration department, arrangements would be made which would place India within the reach of the small capitalist and the mechanic, as Australia is.

Second, as to climate. It must be observed that the hill regions are only now becoming available, but that there is already scope for settlers in the hill towns. With regard to the plains, they are favourable to persons of temperate habits engaged in out-door pursuits, but unfavourable as a general principle for mechanics and persons of sedentary habits who would resort to the towns. The refuge of the hills, however, now allows Calcutta and the other cities of the plains to be occupied by Europeans, as New Orleans and the cities of the Lower Mississippi are. Of the hill climates all that need be said is, that they are as healthy as England, and that relatively to the plains the deaths of European soldiers are only as one to two.

Positive prohibitions formed the third head referred to. These were levelled first at the entrance of independent Englishmen into India, and next to their acquisition of land or enjoyment of political privileges. These have all been abolished.

Although the positive prohibitions to English settlement are abolished, settlement cannot be said to be favoured from various causes, which have yet to be remedied. The first of all is, that an Englishman in India finds himself in the only part of the empire where he is deprived of the rights of citizenship and of self-government. This is maintained by some authorities under the plea that to allow an Englishman English rights in India, is to give him an advantage over the native, which is alleged to be unfair, because the natives, in a mass, cannot on any sane political grounds be endowed with English rights at this time. The injustice of depriving an Englishman of his rights within his own territories, is not regarded by these lovers of native rights, whose real object is to reduce the Englishman to the same jurisdiction of the English and black civil servants, to which the native is subjected. The genuineness of the objections can, however, be tested in a very simple manner, for surely it would be better to elevate the Hindoo than to depress the Englishman. Inasmuch as Hindoos have hitherto been exceptionally governed by Hindoo law, Mahomedans by the Koran, and the English at the presidency towns by the Supreme Court, it is no more exceptional that Englishmen shall be governed by English law throughout India. The natives can be elevated in mass by the gradual improvement of their own institutions, and individually, those possessing a knowledge of the English language, and the other qualifications required, could be allowed to obtain English citizenships and English privileges. Thus the whole country would be gradually raised to a higher standard, instead of the best part of the population being debased beneath their

own standard to a very low one, for a low one is that which, depriving an Englishman of the verdict of his peers, places him at the mercy of corrupt native judges and officials, and corrupt and perjured witnesses, evils if not inseparable from the native character, at any rate such as cannot rationally be expected to be remedied in the present generation.

The land regulations are radically vicious, for however the subject may be mystified, it remains as a positive fact that there is no freehold tenure throughout India, but a kind of copyhold or, at the best, a tenure in petit serjeantcy, or on chief rent at the mercy of the Court of Exchequer, a system of tenure common enough in the middle ages, and which, on account of its vices, has been abolished throughout Europe, and a freehold tenure substituted. To demand a freehold tenure in India, is not as represented to demand the abolition of the land-tax or exemption from taxation, but simply to demand the application of justice and common sense. To take the example of Canada, the quit-rent system has been abolished, the exactness of the seigniorial (or zemindarial) tenures has been provided for, but land-tax for general and local purposes is regularly levied. There is no valid reason why in any part of India, by judicious regulations, the land tenures should not be corrected, even in Bengal, where all the privileges of private property, as against public rights, are now claimed for the zemindar. The zemindaries may be divided up, a power of enfranchisement from zemindarial rights granted to tenants, and the benefits of measures correspondent to the Encumbered Estates and Copyhold Enfranchisement Acts be conferred on the resident population. The East Indian government has been liberal in the grant of lands under quit-rents for tea plantations, but nothing short of a free system will secure the development of English enterprise, and the advancement of the native population.

The administration of justice, as already intimated, is repugnant to English notions. The English magistrates are very few—in some places one to a million of people—they are frequently removed to other parts—their native assistants are inefficient—and as to the police, it is admitted on all hands to be defective. The scarcity of magistrates renders justice dilatory, and favours injustice, and the police are looked upon as instruments of oppression and accomplices of vice. The number of magistrates, it is acknowledged, must be increased, and the police put under English superintendence. With the progress of English population, justices of the peace may be appointed from the English and qualified natives, as in the colonies.

The centralization of the Government, and the want of municipal institutions, is another obstacle in the way of the settler, and which a more numerous English population can best remedy. Then municipalities may be granted to the towns, and the county magistrates carry out the district administration.

To the covenanted service, a body of superior civil servants in India, has been awarded by many good authorities the praise of being the best educated and ablest administrative body in the world; but so far as English settlers are concerned, the government functionaries have acted rather by way of discouragement than of inducement. It is not that there is any positive legislative restriction in the way of the settler, but he is deprived of his rights and placed at the mercy of the government judicial and revenue officers, whose wish is to place him on a level with their native dependents. A spirit of cliquism keeps the settler outside the magic circle. The one or two civil functionaries, and the three or four military officers of the station, treat him as an inferior; the natives may annoy him without fear of discountenance, and, indeed, in many parts of India, the relation of the Englishman to the community around him, is not much better than that of the free black in the slave states of America. The indigo planter, by English spirit, may, in the long run, discomfit the Zemin-

dar, and keep the native officials and police in check, but he may be subjected to annoyance, pilfering, and loss to no small extent. So long as the governing body form a caste apart, no education and no talents will redeem the free settler from a position of undue dependence, and nothing short of his participation in the administration of justice as in other colonies, will secure him fair play, and, in the case of India, advance the condition of the local population.

Whatever local circumstances may be alleged as affecting the political and administrative arrangements of the lower districts, in the hills the population is scanty, and without any political claims, and it is perfectly practicable to afford the English settler full English rights, and to place the local population under English law and administration.

The inquiry now in progress in the House of Commons is making known the true state of the facts as affecting the English settlers, and the result must be at an earlier or later period to remedy all the evils complained of, and although for a time the prejudices of the governing caste may be shocked, in the end their patriotic instincts will prevail, and they will themselves be assisted to carry out to a far greater extent than they have yet been able, the many noble measures they have framed for the welfare of the millions under their charge.

If we look to the present condition of India, great as may be the misery of many districts and of many classes of the population, it is undeniable that great improvements have taken place throughout the country. The administrators have shown an earnest desire to purify the Courts of Justice; they have abolished suttee, infanticide, thuggism, gang robbery, and other abuses, and they have greatly contributed to the security of property and the safety of life and limb. All this is purely owing to English influence, to the influence of the civil and military functionaries.

If we look at the commercial advancement, it is likewise to be attributed to English influence, either of individual enterprise or assisted by government co-operation. Take, for instance, the indigo cultivation, which has created a great staple for India; then the commerce in cotton, which produced a few thousand pounds in the last century, and has been raised to a hundred million pounds, exclusive of exports to China.* The opium trade is another great resource for India. The culture of sugar has been improved and extended, so likewise has that of silk. Rice is an article of large trade to England and China. Jute is a substance hardly known a few years ago, except as dunnage, and which is now a valuable raw material.† The seed oils have of late years suddenly sprung into commercial importance. Sheep's wool and goats' hair, which were trifles, every year are exported in greater abundance.‡ Teak, for shipbuilding,

* John Chapman, "Cotton and Commerce of India."

† See P. L. Simmonds, "Commercial Products of the Vegetable Kingdom;" and likewise P. L. Simmonds, "Dictionary of Trade Products," for this and other articles.

‡ My friend, Mr. Daniel Hazard, has favoured me with the following return of the Indian wool trade.

An Account of the Number of Bales of Sheep's Wool imported into the Ports of the United Kingdom, from Bombay, during the following years:—

1835 1,397 Bales.	1847 8,123 Bales.
1836 3,493 —	1848 16,923 —
1837 5,665 —	1849 11,041 —
1838 6,117 —	1850 9,704 —
1839 5,674 —	1851 12,596 —
1840 7,611 —	1852 22,130 —
1841 10,563 —	1853 35,540 —
1842 11,876 —	1854 43,540 —
1843 6,594 —	1855 42,029 —
1844 6,741 —	1856 47,264 —
1845 10,065 —	1857 57,985 —
1846 11,279 —	

(Average Weight per Bale, 334 lbs. gross.)

N.B. The average value of East India wool may be estimated

had its established place in the English market. Tea must again be named as a growing export. All these branches of commerce are the results of English enterprise, and were it not for English exertions they would have remained barren.

These are unmistakable results, to be proved by the official tables of trade and shipping, but within the country the same influence is at work. Steam navigation has been introduced on the coasts and rivers, railways have been begun, telegraphs are laid down, coal mines are opened, gas is manufactured, the rivers are spanned by the suspension bridge, and indeed every improvement of Europe and America has been naturalized in India, which has been thrown open to the free commerce of the world.

Looking at these facts we assert that the English element is the chief one in the advancement of India, the whole experience of the past proves it, and we call upon the public, and we call upon the legislature, in the interest of England, and the interest of India, to take measures for the infusion of English blood into that country.

One of the first steps towards this is, we assert, the encouragement of the hill settlements, and of English emigration to those districts, and thereby as a certain result increasing the number of English settlers in the plains.

The districts available for occupation we may broadly assign as the whole frontier region of the Sub-Himalayas and its extensions, from Assam round to the limits of the Punjab, including Cashmere and Nepal; the ranges of Central India on each side of the Nerbudda; and the Western Ghats with the tablelands adjoining it and the Neilgherries. Whether the Burdwan range can be advantageously occupied is yet matter of research.

The higher mountain sites, which are best adapted for towns, garrisons, and permanent residences, are in many cases destitute of immediate agricultural resources, but in other regions there are large districts near at hand, available for all the productions of temperate or semi-tropical climates. Such are Cashmere, Mysore, and extensive districts in the Dekkan. Where centres of settlement have been provided, the English immigrants will spread as they have done in Ceylon, and, instead of India, as a whole, being regarded as inimical to English constitutions, it will be found that the greater part of it is readily accessible to enterprise, and an immense extension of production will take place. Then shall we see coffee under English capitalists as in Ceylon, sugar as in the Mauritius and Natal, and cotton as in Louisiana.

Parishath, in the Burdwan range, has been pointed out for settlement by Sir Macdonald Stephenson and others, and if this can be done, another healthy station will be found for Calcutta, in a country affording great mineral resources in coal and copper mines.

Assam is a district acquired of late years, in which the establishment of the tea cultivation has brought it under European superintendence and influence. In this remote country the Assam Tea Company and many private individuals have founded tea plantations, and to such an extent that the crop of the company alone in the year 1857 was 710,000 lbs. Many parts of Assam are unhealthy, but there is the choice of sites, and as there is abundance of new land, and sufficient cheap labour, new factories are springing up, houses with galvanized iron roofs are raised, and steam-boats are run on the Burrampooter.* In these villages and tea stations many English residents are to be found, and there is ample scope

at £8 per bale, so that the 1,397 bales imported in the year 1835 may be put down at £11,176. And, during the next 22 years has increased to the extent of—57,985 bales, worth £463,380.

* See the *Illustrated London News*, August 15th, 1857, quoted in "Colonisation, Defence, and Railways in India."

for enterprize. Besides tea, sugar, rum, lac-dye, timber, and caoutchouc, are articles of English trade.

Cachar, one of the divisions of Assam, produces tea of good quality. A company has been formed, called the "Cachar Tea Company," and there are a score of other tea-plantations. The war alone has stopped the influx of Europeans. The military duties are performed by hill-natives, called Kookies.

The Durrung division of Assam has two tea establishments, a lac dye manufactory, and a military church. Lac-dye is one of the articles to which English enterprize is now being extended.

In the Gowalparah division of Assam, the English have engaged in the timber trade, and are working the forests of the uplands. Here, as in other parts of Assam, English schools are established.

Kamroop, or Gowhatty, has several English establishments for tea, timber, the manufacture of caoutchouc, lac-dye, and rum. There is a station of the American Baptist Mission. The troops are native, consisting of Assam Light Infantry, of which there are two regiments. Throughout the hill stations it will be observed that the natives have become readily associated with us, and consisting of tribes of distinct origin, and having no sympathy with the people of the plains, can be safely enrolled, and have rendered considerable services during the late commotions. Thus they are induced to value the English alliance, and are trained up as good subjects. Caoutchouc, it will be seen, is, in this district, a result of English enterprize, as are the products of the forests hitherto unutilised.

The Luckimpore, or Debrogur division of Assam is one of the tea districts, and there are tea gardens at Chubwa, Dikkun, Myjaun, Disraalle, and other places; one of these companies or firms employs three English assistants. There is a church.

Nowgong, in Assam, is a tea and sugar district. There is an American Baptist Mission Station—Assam being one of the districts in which the American Baptist Society co-operates with us for the civilisation of the natives.

Seesaugur is the great tea district of the Assam Company. They have here five tea-gardens, and employ fourteen English, including a civil engineer, a surgeon, and an accountant. The American missionaries have, besides chapels and schools, a girls' boarding-school, and a printing-press, from which is issued a monthly paper in Assamese.

The Golaughaut district of Seesaugur includes tea-gardens and sugar works.

Throughout Assam is a considerable native population, available for the supply of labour, and it has the advantage of the large navigable stream of the Burrampooter, with its steamers, as an outlet for commerce, communicating, though by circuitous routes, with the port of Calcutta.

Attached to the Assam Government or Commission is that of Sylhet. The productions of this district include coal, iron, limestone, timber, lac, caoutchouc, wax, honey, betel nuts, oranges, cassia, tea, and cotton. It will be observed that these are chiefly mineral and forest products, affording good scope for the application of capital and enterprise in obtaining the raw products, and in preparing them for the market in the first manufactured state.

Sylhet is a hill country, which has likewise been occupied for tea plantations, and a sanitarium has been formed here, named Chirra Ponjee, but the climate, though not unhealthy, is very wet. It was selected as a European station on account of its elevation and healthiness, and is on the high road from Sylhet to Gowahatty.* The neighbouring wild tribes of the Kasias and Garrows gave some trouble at first, but the settlement was formed.

It is on a flat table-land, three miles long and two broad, and where the settlement is it is bleak and barren, with scarcely a shrub or tree to be seen, except clumps of the screw pine. The low white bungalows are few in number and very scattered, and there is a church. For this barren aspect the views from the margins of the plateau are a compensation, and are described by Dr. Hooker in glowing terms for their magnificence. The climate is so wet that Dr. Hooker recorded thirty inches of rain in one night, and Mr. Yule, 264 inches or 22 feet in the month of August; thus the little streams about Chirra will rise fourteen feet in as many hours and inundate the whole flat; but the natural drainage is so complete that it actually makes the soil sterile. Coal, however, is very cheap, so that the residents have protection indoors against the damp. Under these circumstances, Chirra has gone out of favour, and given way to Darjeeling as a sanitarium for Eastern Bengal, but it has several residents, and a church dedicated to St. Bartholomew. In the district of the Cossyah and Jynteah hills are the mines of the Sylhet Coal Company, and limestone is likewise wrought for the supply of lime to the low countries. The mines of the coal company are at Larkabong and Chirra Ponjee. The coal is described as of good quality. At Sylhet is the church of St. Michael, and at Sheik Ghaut, in the neighbourhood, is an establishment of the Welsh Missionary Society.

One of the most remarkable events in connexion with Sylhet, is the discovery, as proclaimed by the government, that the tea plant is indigenous in the pergunnahs of Ruffeenuggur, Chapghat, and Paunchkhund, the trees having been found to the number of many thousands, almost entirely on waste jungle-land in Ruffeenuggur and Chapghat, and on the teelas or detached hills, 400 or 500 feet high, in Paunchkhund. As this land is all unsettled, the government at once issued regulations, offering it liberally for settlement in grants of not less than 500 acres free at first, and with a gradually increasing quit-rent, grants of hill forests being on special terms.

Darjeeling is one of the most important places in connexion with the English settlement of Bengal. Lying due north of Calcutta, with railway and steamboat communication, open or in progress half the way, a small amount of enterprize will bring it within a few hours reach of Calcutta. Its advantages were first discovered about the month of February, 1828, by Mr. J. W. Grant, of the Civil Service, at that time resident at Malda, and by Captain, now Major-General G. W. A. Lloyd, who were employed in settling the boundary between Nepaul and Sikhim. These gentlemen represented the facts to the Governor-General, Lord William Bentinck, in 1829, and that great man, it is said, never lost sight of the expediency of establishing on this tract of the Sikkim hills a station for the relief of those whose health demanded relief from the heat of the Bengal plains. He directed Major Herbert, Deputy Surveyor-General, to explore the site, and the results having been brought before the Court of Directors, they highly approved of the plan, and extended it with a view of its forming a depot for the temporary reception of English recruits, and even as a permanent station for a European regiment. This undertaking likewise received the fostering care of Lord Auckland during his government, as also of the successive deputy governors of Bengal, and of the present Governor-General, Lord Canning.

The situation of Darjeeling is in a spur of the Great Sinchal mountain, which itself rises nearly to a height of 9,000 feet, throwing out several spurs. One of these is Darjeeling, a hog-backed ridge, with a steep descent on its eastern side to the torrent of Rogno, and on the west and south-west declining in more gentle declivities, broken into knolls, and intersected by numerous stream-lets, and forming a fine amphitheatre, extending from two to three miles, and dotted with villas, military establishments, the civil offices, the church, hotels, and other buildings. On other spurs are several neighbouring villages and hamlets, for Darjeeling has already become a

* Hooker's Himalayan Journals, Vol. 2, p. 273.

small centre of colonization. In the neighbourhood, nearer or further off, are Gnadenburg, the German mission, Hope Town (an English settlement), Leebong, Jelapahar, Tagoar (the tea plantations of Capt. Masson), and Kursion.

The great attraction of Darjeeling to visitors is the noble view of Deodhunga, 29,002 feet high, of Kunchinginga 28,176 feet high, and some of the highest peaks of the Himalayas, affording perhaps the grandest scenery in the world. Thus, in the future of Darjeeling is its situation as one of the chief places of resort by the Indian traveller.

Darjeeling is a small place, according to English notions, and is little more than a village, but is rapidly growing in importance. It has a church, Baptist and Roman Catholic chapels, nunnery, boarding and other schools for boys and girls, public library, masonic lodge, hospital, treasury, jail, hotels, and various shops. It is one of those places to which English children are sent for education, and there they get the rosy cheeks of old England. There are numerous residents for health occupying the villas. The military establishment consists of a hill corps, a body of English invalids, and this year cantonments are prepared for an English battalion.

The neighbouring district, a part of Sikhim, now belongs to the English, and includes a population of 50,000, available for labouring purposes. The remaining district of Sikhim is dependent on England, and can be likewise occupied for settlement when the necessity arises.

The great value of the Darjeeling and Sikhim territory arises from its lying between Nepal, Thibet, and Bhootan, on one of the natural routes to Central Asia, commanding the trade on the eastern frontier. The produce and exports from these districts include gold-dust, iron, copper, lime, woods, tea, wax, ginger, catechu, cassia, coffee, cotton, hemp, gunny, rice, cardamoms, oranges, potatoes, ghee, hides, horns, musk, wool, chowries, blankets, woollen cloths, and many other articles.

As a political position, it commands the countries referred to, and prevents the Nepaulese from seizing Bhootan, which they are anxious to do, and whereby we should have those dangerous neighbours, the Goorkhas, now our allies, spread further along our frontier.

At present we have but a small share in the trade of Central Asia, Chinese tea being brought from 2,000 miles off close to our border, Russian woollens and manufactures being likewise imported to Thibet.

The rise of Darjeeling, and the attention which it now attracts as an advanced post for the promotion of English influence, is chiefly owing to the exertions of Dr. Archibald Campbell, the superintendent or governor, who is one of those remarkable men to whom we are indebted for building up and preserving our Indian empire. Campbell has done on a small scale what the Lawrences have done with the kingdoms under their rule. A small outpost he has made a province; he has subjected the neighbouring rajah, promoted agriculture, created commerce, encouraged settlers, and enlisted troops. In the late disturbances, by his influence he raised considerable recruits among the Goorkhas, held his own, and afforded assistance to the superior government. He has introduced the culture of tea and other articles, and has made important experiments on cotton in the lower districts. There he has succeeded in growing the sea-island cotton, and is now prosecuting further trials. He has been very active in promoting roads and the railway, and has lately again called the attention of the Supreme Government to the trade with Thibet.

In 1849 I proposed to extend the telegraph to that station, a measure since approved, and Sir Macdonald Stephenson afterwards projected an extension of his East Indian Railway in this direction. Last year we brought this subject before Mr. Campbell, who has done much for its prosecution. It will be observed that Darjeeling lies about 375 miles north of Calcutta, that the East

Indian Railway proceeds north-westerly, as far as far as Rojinahal, and that consequently the branch to give Calcutta a complete northern line and connect it with Darjeeling is under 200 miles. The name of the company for the new line, is the Northern Bengal Railway Company, which is now in communication with the Indian Government for obtaining the necessary authorization. The Government have received reports in favour of Darjeeling as a situation for English settlement, and have sent out to obtain the opinion of the local authorities as to the best means of encouraging a railway or tramway.

This railway will produce the most important results in Bengal, for while it will enable English and hill troops to be poured down on the plains, it will, on the other side, give to the inhabitants of Calcutta the climates of England or Switzerland, which, in a few hours, and at a small expense, they will exchange for that of the tropics. Only a few years ago the total charge of a first-class traveller from Calcutta to Darjeeling was £25, and the time employed seven days. This has been now much abridged, but the difficulty of access is still the chief obstacle to the progress of Darjeeling, and until the railway is opened throughout it must linger. Then an emigrant passenger will be carried up in a day for sixteen or seventeen shillings.

Passing from Darjeeling, the range of the sub-Himalayas, containing some fine valleys, and country available for settlements, is in the possession of the Nepaulese, and is for the time closed against us. We then come to a group of hill countries, including Kemaon, or Almorah, the Dehrah Dhoon, and Simla.

Kemaon or Kumaon includes the districts of Kemaon or Almora, Gurhwal, and Nynce Tal. This country has attracted attention for its iron mines.*

Almora has an English population as well as a native one. Here is a considerable establishment.

Hawulbagh, five miles distant, has, however, the chief residences, and here are the military cantonments. In the neighbourhood are tea plantations.

Gurhwal has many iron and other mines, but the produce is very small. The forests are under Government supervision. The chief town is Sreenuggur.

At Paronee, in Gurhwal, are tea plantations.

Nynce Tal, in a romantic situation, by the side of a lake among the hills, is the favourite sanitarium in Kemaon. It has been a city of refuge during the troubles.

Bheen Tal is a village, with tea plantations.

Dehrah or Deyrah Dhoon is a district about the size of an English shire. The town is delightfully situated, and is in a good route for trade. The neighbouring country is fertile, but, where uncleared, most unhealthy from rank vegetation. In this district an experiment was made of colonization by invalid soldiers and Portuguese Hindoos, and as it failed as a matter of course, as all military colonies have, and as the Portuguese of India are sure to fail, it is now set up as a stock argument against English settlement in India. The spread of the tea cultivation alone is answer enough to the Dhoon experiment. The town has a church, American Presbyterian, and Roman Catholic church, and a variety of public establishments, among which is a station of the Great Trigonometrical Survey of India. The forests of the Dhoon are of importance, and are under government superintendence.

Landour, near Dehrah, is a sanitary station, regularly frequented by the Meerut officers, and forms a considerable town with military and civil establishments. There are a church and Roman Catholic chapel.

At the village of Woodstock is a Protestant girls' boarding-school.

* See Report on the Metalliferous Deposits of Kumaon and Gurhwal, by W. J. Henwood, F.R.S., and Tramroads in connection with the Iron Mines of Kumaon, by W. P. Andrew.

Mussoorie is so close to Landour, that the towns or villages are almost connected by the rambling villas; it has a church, and there are a Roman Catholic chapel, and a very well conducted Roman Catholic school, or rather college for boys. A nunnery is another Roman Catholic establishment, with a boarding school attached. It will be observed in surveying the hill towns, that the Roman Catholic missionary authorities have very skillfully selected them for occupation by churches, nunneries, and boarding-schools, and as the cost is paid by the pupils from the plains, these become reproductive establishments. At Mussoorie there is a superior church school for boys, and there is a common girls' school, besides two boarding-schools for young ladies. Dancing and music are taught in this remote region. Beer is brewed from native barley at this place, and forms a new and permanent branch of trade.

Kenilworth and Clarkeville are places at Mussoorie.

Simla is at present the most important of the hill towns, and is so far metropolitan that it has been the frequent residence of governor-generals, lieutenant-governors, commanders in chief and high authorities. Like most of these sanatoria, it is perched on a narrow ridge of mountains with dwellings scattered on every available spot, often of narrow area. It was only in 1819 that the first English dwelling was erected here by Lieutenant Ross, but by 1841 it had become a regular English town, and has since much increased.* Sometimes some twenty thousand persons are temporarily assembled, when the Governor-General takes up his abode in the town. In Simla and the neighbouring towns and villages, are to be found many residences. Christchurch is a costly edifice with an organ. There is a Baptist chapel. There are boarding-schools for boys and girls, and five district schools of the Church Missionary Society. The local governor, called a commissioner, is provided with numerous functionaries and establishments. This is one of the few places in India which has a municipality, and the only one which has an English municipality, an institution which it is to be hoped will rapidly extend throughout India. There are an observatory, large dispensary, bank, library, hotels, assembly rooms, type, copper-plate, and lithographic printing-house, and many shops.

Boileaugung is a village near Simla, named after a distinguished engineer officer, General Boileau.

Jutogh is the military station near Simla.

Kotgur is a town 50 miles north of Simla. Here are a Church Mission, a boys' and girls' school of the Church Missionary Society, a school of industry, and station of the Moravian Missionary Society. In the districts are five boys' schools. The Moravian Missionaries have chosen this as a temporary residence, in order to penetrate the interior from this point, and establish missions among the Tartars and Mongols. The tea cultivation has been successfully introduced in this district.

Kussowlee, in the Simla district, is a sanitary station, having large establishments, but suffering from the want of water, which has to be brought from a mile and a quarter distance. The buildings are distributed around a hill of five miles in circuit. There are a church and Roman Catholic chapel. Here is the residence of another Commissioner. A brewery has been successfully established here likewise.

Sanawur, near Kussowlee, is the seat of a most interesting establishment, the Lawrence Military Asylum. This was founded by that great man Sir Henry Lawrence, and is one of the munificent foundations of that noble family. In 1856, it contained 200 boys and 200 girls, orphans of English soldiers, who, among other employments, are taught printing, bookbinding, and

electro-telegraphy. It is likewise the Military Normal School for training schoolmasters for the Bengal army.

Dugshaie in the same region is a station of Sirmoor, having an established church and a Roman Catholic Church. In the district a hill regiment is raised. The place is 16 miles from Simla.

Soobathoo, another of these towns, is by some preferred to Simla. The population is chiefly composed of native immigrants and refugees from the hill states. There are a church, American Presbyterian Chapel, Roman Catholic Chapel, and Masonic Lodge. It is a sanitarium, and one of the most healthy stations for troops. In the neighbouring valleys and steep mountain sides, cultivation is industriously carried on, the produce being rice, maize, wheat, barley, millet, ginger, cotton, opium, tobacco, oil-seeds, red pepper, hemp, vegetables, apricots, peaches, walnuts, apples, wild pears, raspberries, strawberries, and melons, being the varied growth of several climates in close neighbourhood.

To Simla and Soobathoo a railway has been proposed from the main lines, but it languishes at present in consequence of the disturbed state of the neighbouring parts of India. Railway communication, however, once established, these military regions would pour down large supplies of troops, fresh and vigorous, as they have done small bodies for the wars on the frontier and for the present intestine war.

The great group of what may be called for the purpose the Simla military towns, is among those which afford the smallest resources for agricultural operations or other enterprise, but the trade consequent on the provision of troops and the gradual development of industry, will hereafter invite many settlers.

We now come to scattered towns, of much later establishment, being the military sanatoria lately formed by the Lawrences and other administrators on the hills adjoining our most western territories in India.

Murree is on a hill between the rivers Indus and Jhelum, in the Punjab, established in 1851. Here of late was the seat of the great Governor, Sir James Lawrence, one of the saviours of the empire. It has already a large population, and includes a military depot, church, the revenue survey department, and many villas.

Dalhousie is a sanitarium and hill station in the Punjab, in the Chumba hills, 120 miles north-east from Lahore, founded quite lately for the Sealkote and Lahore divisions, and named in honour of the late distinguished Governor-General.

Dhurrumsala is another Punjab military sanitarium, with church and small barracks. Here the tea cultivation has been introduced.

Kyelang is a Moravian missionary station in the same province.

Budorodeen, a small military sanitarium, was founded in the Marquis of Dalhousie's Government in 1853, and is between Bunnoo and Dera Ismael Khan.

Abbotabad, named after the distinguished James Abbott, is a military station 22 miles north of Hurri-pore.

Ghizree is a sanitarium newly established by the Bengal Government in Sind, for the Kurrachee brigade of the division of its army occupying that country.

Our next district is Aboo or Mount Aboo, in the territory of Serohee, in Rajapootana, connected with the Arawulli range, and being the only station of the kind in the ranges of Central India, which it is supposed will, on survey, be found to present many suitable sites. It is a new town, and is a post of the agent for the States of Rajapootana, and has a church and many English invalid residents. Here is another foundation of Sir Henry Lawrence, the Aboo Lawrence School, for thirty boys and seventy girls of English soldiers. It may not be forgotten that a special appeal has been made for the endowment of the Lawrence schools, as a memorial of that eminent man, Sir Henry Lawrence, and of the family.

Erinpoora is the military station of Aboo.

* For information on this and other places, the chief authorities used are *Thornton's Gazetteer* and the *New Calcutta Directory*.

We now proceed further south, to the Bombay Presidency. Along the shore of that presidency, the chain of the Western Ghats arises like a wall parallel to the sea, and supports the several table lands of the Dekkan. Thus the inhabitants of Bombay by ascending these hills, which the Great Indian Peninsular Railway will facilitate, obtain a refuge during the violent heats. Poona on that railway has long been a favourite civil and military station, and in its neighbourhood various establishments have been formed.

Dapoorie, four miles distant, is a town with botanical gardens. The season residence of the Governor of Bombay is in this district.

Kerkee is a place two miles from Dapooree.

Poorundhur is a sanitarium in this division, having an establishment of invalids.

Mattheran is a hill station in the northern division of Bombay, in Tanna collectorate.

Mahabuleshwar is a small town on a fertile range of the Western Ghats in the Bombay presidency, but having heavy rains in the monsoons. It was founded by Sir John Malcolm, in 1828. It has a church, library, hotel, bazaar, and invalid garrison. Malcolmpeth is a neighbouring village.

The district of the Neilgherries is a private southern resort for the Madras and Bombay authorities. Ootacamund is its chief town, and is in the Coimbatore district. It was founded in 1822. It has a church, public gardens, and meteorological observatory.

Bishopdown is a place near the town, where there is a cantonment for sick soldiers.

Koonoor is a small station in the Neilgherries, with many English villas, an hotel, and bazaar.

Kotageri is a neighbouring sanitarium.

Kaity is the seat of a German mission in these hills.

One of the best districts for English settlement in India has not been yet named, and that is the valley of Cashmere. By some unfortunate oversight this was assigned to the late Gholab Singh, as a compensation for his political deeds in the Punjab, though any territory of corresponding revenue would have been equally remunerative to him as Cashmere, on which he had no hereditary claim. His successor may be disposed to exchange this territory on some occasion for an equivalent compensation or revenue, if some additional income be held out as an inducement. This should not be lost sight of by the Indian authorities.

The chief results to be deduced from an examination of the hill regions may now be considered. They afford many healthy sites for the residence of English settlers. They afford abundant scope for the enterprise of settlers of large or small capital in the development of the minerals, field produce, and agriculture, and in commercial operations. They present suitable situations for the cantonment of the chief European force now required for India.

By means of railways and tramways they can be connected with the plains, so that the hill garrisons will as effectually command the lower provinces as garrisons in the unhealthy stations. A great economy in the maintenance of the troops will be effected, while the funds so disbursed will contribute to the resources of the hill settlers, and the population of the hills will be strengthened by the soldiery, their families, and dependents. The hill stations afford the healthiest residences, and by means of railways, convenient stations for the governors and chief officers. The Europeans stationed in the plains can keep their families on the hills, and in case of illness can readily resort to healthy climates. The hill towns, becoming the seats of the clergy, schools, engineers, professional men, and skilled mechanics, will afford unprecedented means for extending a purer religion and morality, and a higher civilization among the millions of India.*

* Major-General Tremenheere, in an able paper on "Public Works," read before the Institution of Civil Engineers, on the

The advance of these settlements will open not only new sources of local trade, but promote intercourse with central Asia, and secure our interests in that direction.

The military resources of the soldiery and settlers will secure the whole of the presidencies of India against internal commotion by their distribution of active forces and reserves among the mountain ranges. The growth of English population and improved communication with the hill tribes on the northern frontiers, will present a secure barrier against Russia, Afghanistan, Nepaul, and Thibet.

New resources will thus be made available for our home population in this great field of enterprise, whence settlers can profit by the development of agriculture and commerce in the fertile regions of Hindostan.

The thorough establishment of the railway system is a necessity for Lower India, and for the proper operation of the hill settlements. Main lines already authorized by the Indian Government run parallel to the hill regions or approach some of the important settlements, and a provision of cheap branch lines or tramways will make the hill towns effective for military or commercial purposes.

On a superficial view, it seems necessary to place the military stations in the great cities, as Calcutta, Delhi, Agra, Benares, and so forth, with the view of commanding large populations and the main positions. A more careful view will show that the most effective plan, on sound military considerations, is to place the chief force in healthy stations, that is to say, in the hill-towns. We have tried the system of garrisoning the cities of the plains, and it has failed during the late calamities, to afford us the required advantages, for good military reasons. The military force in India is not generally required to keep down the local population, but to be held in reserve, ready to suppress any insurrection, or to act as a field force when required. The central hill stations of India would provide better bases of operations than the cities of the plains, but to make either effectual, the communications must be brought into good condition. It was the want of rapid communication which allowed Delhi, Cawnpore, and Lucknow to maintain their insurrections and hold out against us, and the forces required for their reduction were not obtained from the local garrisons, but from without, from the north-west, from Calcutta, and from the southern presidencies. The plan of placing the forces in Meerut, Cawnpore, and the lower stations is in fact a military mistake, for they can only be kept there at great loss of health and efficiency, the deaths being two to one as compared with the hills, and rendering the assistance of native auxiliaries necessary.

In a political point of view, the garrisons must be placed in the hills, and the railway system extended. The result will be that English settlement will be encouraged

4th of May, said:—"One great deficiency in India was the almost total absence of trustworthy and well-instructed European subordinate agents, which was the first difficulty to be encountered in the prosecution of any enterprise, or the execution of any great works in India. The author proposed that this defect should be remedied by training the children of the European soldiers in India in industrial establishments, to be formed in the Himalayas; and he showed that thousands of English soldiers continually perished in India, without adding to that very element in the settled population of the country which recent events had shown to be so much required. Those children who were born in the barracks died in the plains, in the ratio of four out of every five. There were at this moment 900 children of soldiers at the station of Dum Dum, near Calcutta, most of whom might be saved and be turned into useful overseers, trained agriculturists, and teachers of various branches of skilled industry, if they could be removed to the hills. The author also proposed, with a view to increase the European population, and the settling in India of the lower and middle classes, that the permission for the marriage of soldiers going to India should be extended beyond its present limit of 12 per cent."

without any special outlay taking place, and without the exercise of any special patronage. Thus what we ask is not an enormous expenditure, as alleged, for an experiment in colonization for the benefit of the emigrant classes in England, but only that those measures shall be carried out which are imperative for the good government of India. Seldom is there an opportunity such as this for carrying out a great public measure with facility, requiring careful watching and guidance rather than calling for pecuniary outlay.

The same railways which carry the soldier and his equipments speedily and economically, will carry the settler and the trader cheaply, and enable them to penetrate the country, and it is easy to trace this operation. In the United States or in Canada where the railway system has been applied to a thinner population and a less productive country, the Irish or German emigrant who arrives at New York can travel a thousand miles in a few days, and reach the lakes in the far west for very few pounds. To reach Darjeeling or Simla now he must spend a small fortune, lose time and hazard his health. With the railway he will reach a place of settlement in India as readily as one in Michigan or Canada West.

What we want for India is what has been given to Canada. This conceded, we shall achieve the like results. Prices will rise, labour be enhanced, land increase in value. In India the labourer now earns two shillings a month, and the whole rent and taxation of an acre of land is some eighteen-pence a year. In the Western World, on the other hand, labour is scarce and high-priced, and waste land will sell for as much in many places as the cultivated land of India.

Thus, the grand operation of improved communication will be productive of important economical resources, not only by increasing the real wealth of India, but by creating higher prices.* If these consequences be carefully provided for, the advantages must be great to the metropolitan country and to India. Lands now worth from £1 to £2 per acre, will fetch European prices, and the Government, while receiving a higher revenue, may for the enfranchisement† of the land and the creation

of a freehold tenure, acquire a compensation enormous as is the extent of land dealt with, and the population interested in its cultivation. In speaking of the public rights in the land of India as equivalent to the redemption of the national debts of England and India, and as affording a large fund for public improvements, I have been suspected of extravagance and exaggeration, but whoever carefully watches this subject will see that it is one of importance, and that in this part of the good government of India is to be found a rich and legitimate reward for our labour.

Those who have attempted to exclude the English settler from India have set up the doctrine of India for the Hindoos, and talked of any regard for English interests as an invasion of native rights. The time will soon come when the injustice of this dogma will be seen, and England will not rest satisfied with passive self-gratification in the welfare of India, but will claim her share in the resources of the empire. The United States, on the acquisition of California, possessed themselves, for federal purposes, of the land revenues, customs, postage duties, and supreme court fees, leaving local charges to be met by local taxation. With those funds part of the public expenses of the United States have been met, and the public debt has been reduced. From India we derive not one farthing, and have been subjected to considerable expense for Indian purposes.

If emigration to India be conducted on a sound basis, then measures should be taken to obtain some compensation from the immigrant for the benefits conferred on him, either by the imposition of a small poll tax, or by the apportionment of the land fund, so that a permanent fund may be created to promote English immigration, and particularly female immigration, and in all cases where an advance is made for such purposes, it should be by way of loan, so that being repaid and reapplied, the fund may produce the greatest results. At present, under the Australian, New Zealand, and Cape system, a young man is taken out by means of the Bounty fund, put in a good position as a labourer, and shortly becomes an independent yeoman,—the colonists lose the benefit of his labour in the labour market, as his passage money is not repaid; and another immigrant is only to be obtained by the further operation of the land sales fund, while many claimants are waiting at home to enjoy the like advantages.*

There are several measures to be kept in view for promoting the objects here pointed out. The first is to carry into effect every legislative improvement requisite to place the English settler in his legitimate position. The consideration of these remedies now occupies Mr. Ewart's Committee. Mr. Ewart has called the attention of the government to another important matter, and that is the provision in any treaty with China for free intercourse with Tibet and the countries on that frontier, where Chinese interference now impedes us. Mr. Campbell tells me, in a letter just received, that he is making a fresh effort to obtain the aid of the Supreme Government of India in opening the trade with Tibet from Darjeeling. Another matter is a watchful policy with regard to the hill states of Nepaul and Cashmere. In

or directly, would be easier met; European imports would increase; the execution of productive public works would be facilitated; and benefits of the utmost moment to the people of India, and to this country, would be the sure result."

* I have on many occasions called attention to the principle of making emigration more extensive, by making it reproductive. Of late this principle is making way, but on a limited scale. The Cape Commissioners are sending out persons whose friends in the Colony give security for the repayment of the advance. The best example, however, as yet, of the working of such a system, is that of the Mormon Perpetual Emigration Fund, a sagacious scheme of the leaders of that community for increasing the neophytes at Salt Lake. The working of this scheme is one of the chief inducements to conversion in their European missions.

* On this subject see the 12th and 13th chapters of my book on "Colonization, Defence, and Railways in our Indian Empire," &c.

† In a very able paper read last night at the Statistical Society, on Indian Finance, Mr. Frederick Hendriks, F.S.S., says:—"Acting upon the precedent of the principle of Mr. Pitt's measure, which rendered the permanent British Land Tax redeemable, a similar course has sometimes been suggested for India. If, however, the carrying out of such a suggestion were restricted in its field of operation distinctly to Bengal alone, or, rather, to those portions of the Bengal presidency where the permanent settlement is an existing institution of the country and cannot be reversed, there do not appear any valid objections to a Land Tax Redemption being effectually carried out. The method should be a cancelment of land tax in exchange for a transfer and cancelment of such an amount of nominal capital in the Indian public debt, as produces an annual dividend precisely equal to the land tax redeemed. A redemption of this kind, not obligatory, but purely permissive, and to be acted upon at the land-holder's own wish, and when his means admitted, would be gradual and self-adjusting; but probably neither the requisite funds, nor the inclination to redeem, would be found wanting in Bengal. But the whole measure of the good it would accomplish is not to be expressed in the mere money result. The middleman, and the inferior servants and agents, who are said to oppress the Bengal ryot, would be more restrained from the power of exercising their love of exaction. And where the state receives, as in Bengal, so large a portion of the rent of the soil, and can disburden itself of the position of chief landlord without any sacrifice, as it would there be enabled to do, it is highly politic thus to increase the number of its freeholding subjects, and, at the same time, to limit their opportunities of oppressing the poorer and hard-working classes. The wealth of the country would be much promoted by the formation of an independent middle class; industrial enterprise would have a better chance of success; a larger revenue from taxation, whether indirectly

their unsettled condition the necessity of interference will arise from time to time, and then judicious arrangements will provide for the welfare of the population and the advancement of our national interests. The English language should be taught and encouraged, and should, in all cases, replace the Persian and other public languages not being the dialect of the local population. A not less useful step is that advocated by Sir C. E. Trevelyan and Professor Newman, of encouraging the Roman type instead of the Hindoo and Arab types for the printing of government proclamations, school books, and gazettes.

In considering for the first time a subject so wide, it is difficult to avoid trespassing on the attention of an audience, and yet impossible to give that fulness of information and of detail requisite to arrive at a conclusive judgment. Enough, however, it is to be hoped, has been done to show that the subject is of importance, and as it is connected with our Indian empire, so neither in this Society, nor among the public at large, will it, when once examined, be considered unworthy of attention.

The Almighty, who, from small beginnings, has raised the English race to the dominion of these islands, and to the occupation of the continent of North America, and has filled it with a nation of our people, has given us the empire of nearly two hundred millions of people in India, and the destinies of a large portion of the human race. This is an inheritance, wonderful in its extent, glorious in its attributes, a means of doing good whereby not individuals, but millions and nations may be blessed, in the promotion of which there is no citizen among us so mean but he may do his share, no intellect so vast but that there shall always be scope for its beneficial exercise, no effort we can make but what will bear fruit, no noble endeavour but will earn its own reward. Let us each in our sphere use these opportunities faithfully, accepting the responsibilities which have thus been offered to us, and while we shall confer lasting happiness on India, the welfare of our race will be hallowed with new hopes and our empire rest on a still nobler foundation.

DISCUSSION.

The CHAIRMAN said, only a brief time remained in which to discuss this highly-important and interesting subject. Seeing present Mr. Theobald, whose name was so materially associated with the question of India, he should be happy to hear that gentleman's observations.

Mr. THEOBALD felt complimented by the invitation of the Chairman, although, quite unexpectedly called upon to take part in the discussion. He had listened to Mr. Hyde Clarke's paper with the greatest pleasure, and the views that gentleman had put forth fully accorded not only with his own opinions but, he believed, with those of every British settler in India. They certainly wanted those improvements, social, political, and judicial, which had been so ably pointed out by Mr. Hyde Clarke, as it could not be denied that all classes in India suffered from the defects in all those points which had been adverted to. With regard to the climate it had been truly observed that the Presidency of Bengal was one of the healthiest in India. They were in the habit of hearing the claims of the United States of America advanced in a sanitary point of view, as favourable to European constitutions, but he did not believe that the physical condition of the population of the United States was better than that of the residents in Bengal. It was very desirable that their fellow countrymen should be disabused of the notions so generally prevalent with regard to the climate of India. It had been placed beyond all question that the hill countries which formed the leading subject of the paper were, in an eminent degree, adapted for European settlers, as the temperature there was much lower than in the plains. At the same time, it must be admitted that neither the hill stations nor the plains were

adapted to Europeans whose occupation was that of agricultural labour, nor was it necessary that Europeans should be so employed. There was native labour in great plenty, which could be procured at a much cheaper rate than European labour. What was most wanted, both in the hill stations and in the plains, was European intelligence, European skill, European civilisation, and he might add, above all, European capital and enterprise, for although many of the natives were very wealthy, they were not persons of enterprise, and did not introduce improvements. They accepted the country, the climate, and the population as they found them; but what was wanted in India was—institutions of a character more in accordance with those which, as British subjects, we were accustomed to associate with the idea of a well-regulated order of things, both social and political. Mr. Hyde Clarke had recommended the establishment of municipal institutions, and the practice of self-government which existed in England, but he (Mr. Theobald) thought that the idea of such institutions was beyond the reach of the experience and capacity of the Indian Government. In the great Presidency cities, such as Calcutta, with a large European population, there were abundant opportunities for municipal management. It was of the first importance that we should be on the best terms with the native population, and he saw no reason why we should not in such cities, and even in the towns of the hill stations, have municipal management. The want of it was greatly felt in Calcutta. He recollected the time when something approaching to that desirable state of things was established in that city; but the government, so unused to municipal institutions, began with that which, even in this country we had not yet attained to, viz., universal suffrage. In the election of municipal commissioners there was universal suffrage; and it was hardly to be supposed that a government constituted as was that of India, would be satisfied with the results of universal suffrage. The consequence was, that those commissioners who had been chosen by universal suffrage were reduced, in the first instance, to half the number originally appointed, and then were made permanent commissioners. He thought a better organization of the Supreme Government was required. It was for the Parliament of this country to say what the form of government in India should be; but, in any case, it should be a system of government which accorded with the feelings of the European population as respected the general administration of affairs. The effect of railways in India would be appreciated by everyone. With regard to the question of land tenure, in every part of India there was a different system; in Bengal proper, which was as large as the entire empire of France, with a population of about 40,000,000, the system of land-tenure was, upon the whole, favourable to European settlement; the effect of which was shown by the fact, that lower Bengal was the only district in which there was any considerable number of European settlers. It was only by a system of tenure in perpetuity that increased European settlement, and the employment of European capital and enterprise in India could be effectually brought about. In the hill-stations, and in Madras and Bombay, the system of government was altogether different. In the province of Oude, which had lately fallen under British dominion, the same system of absolute proprietorship in the soil by the government, as prevailed in Bombay and Madras, had been established, and the rents or assessments were annually collected by an army of police. They would readily imagine that such a system was practically prohibitive of the investment of capital in the soil. What was particularly essential in India, was a proper revenue system, and, above all, due protection to person and property, as well as an administration of justice founded upon equal laws for all classes. In no part

of India did there at present exist a proper administration of justice. The East India Company might be regarded rather as the agent of the Mahomedan government, than as exercising powers in accordance with its own views of what was just and expedient, and the changes that had taken place since India had fallen under British rule, were not such as were to be looked for at the hands of enlightened rulers. An administration of justice, based upon British principles, was urgently required, and where natives were employed as administrators, they ought to be persons properly instructed for the purpose. He was afraid this could not be accomplished without giving the natives a great deal of that sort of education which had not hitherto been given them. They now claimed an excessive share in the administration of all the functions of government, but he (Mr. Theobald) maintained that in order to secure a due administration of justice, they must look upon all classes as holding equal social rights, whether Hindoo, Mahomedan, American, or European—all should be equal in the eye of the law, without distinction of race or creed. That was the British idea of the administration of justice. But in India there was the influence of caste, and the Mahomedan claimed for himself privileges which he was not willing to accord to the Hindoo—in fact, the Hindoo was hated by the Mahomedan, and it was a great mistake to suppose that those different races would exercise towards each other the same impartiality that we in this country should be disposed to show towards them. The East India Company had been opposed to European settlement in India, and to all kinds of settlement by which a social and political position could be acquired. At one period it was the wish of Sir John Malcolm to establish a colony of East Indians who, it was to be remarked, were a race almost as distinct from the native population as the natives themselves. Our Indian population, wishing to provide a vent for their surplus population, entertained the idea of founding a colony of East Indians, but in this they were frustrated by the authorities of the East India Company, as it was opposed to their policy to allow of colonization. What was wanted was—a Government actuated by liberal principles to do impartial justice, both as regarded Europeans and the native population. He believed the few points he had adverted to had formed the great bar to European settlement in India.

Mr. P. L. SIMMONDS said that it had been well remarked that it was British skill, energy, and capital, which had already accomplished so much for India. While congratulating ourselves, however, on the successful results of our exertions in this respect, as evidenced in the largely increased trade and commerce of India as compared with twenty or thirty years ago, there yet remained much to be done, and such a paper as the one they had just listened to was eminently calculated to promote that end by calling increased attention in England to the subject of India and its resources. Not but what India had occupied a very large share of public attention during the past year, but this was chiefly concentrated on its social, political, and disturbed condition, and not specially on its agricultural resources, trade, and commerce. The evidences of British skill and capital were brought prominently before them that evening, not only in the excellent paper of Mr. Clarke, but in the photographs taken of the progress of great public works, the maps and plans of railway extension and canalization, improved river navigation, models of vessels suited to those rivers, and the indigenous products, tea, fibres, &c., which were doubtless familiar to many. Hill colonization by sanitation, the wide extension of the telegraph, the diffusion of the press, of schools, churches, and missionary enterprise were other evidences which had been adverted to by Mr. Clarke. Glancing, however, over that more especial field with which he (Mr. Simmonds) was most conversant,—the commercial products of India—a field of inquiry, in which, since the death of Dr. Royle

(who had done so much to develop the resources of India), he was left almost alone, what did they find? He held in his hand a comparison which he had drawn up of the present Indian exports with those of 20 or 30 years ago. He would not take up the time of the members by quoting it at length, although it proved some very important facts. But this at least he might say, that, large as had been the increased shipments from Indian ports, and greatly as the export trade had been stimulated, the resources of India had not been developed proportionately with those of Mauritius, Ceylon, and Penang, where British settlers and British capital had free play, and full scope for the exercise of their enterprise and skill. It was lamentable to glance over the vast expanse of territory held under British rule in Asia, and to know that the English population was limited to a few thousands. Some of the causes which had led to the obstruction to settlements in India, which had retarded many important industrial operations, would, he hoped, be shortly removed. Then we might expect to see an increased stimulus given to the cultivation and export of many of those staple products which were so readily and cheaply obtained in India, and were so essential and so important to the trades and manufactures of Great Britain. When we saw that from small beginnings the manufacture of tea was making such favourable progress in various districts of India, and that, besides the local consumption, about three-quarters of a million of pounds were now shipped to England, this manufacture must necessarily extend. But at present tea was only a minor product of the hills. The staples of the plains had risen already to great importance, and would, when order and confidence were thoroughly restored, when internal communication was improved, when capital and British skill to direct and encourage were more common, increase still more. Even now India supplied us with one million and a half cwts. of cotton, with three and a half million cwts. of rice (and the cultivation in Arracan was largely on the increase), with one and a quarter million cwts. of sugar, spices, and condiments. Take again jute, hemp, corn, and other fibres, and these reached an aggregate of about 800,000 cwts.; oils to the extent of 73,000 cwt. came in annually from India; gums, and resins, and vegetable extracts reached 5,000 to 6,000 tons. Then there were wax and silk, and the important products of the forests, besides the dye woods and dye stuffs, such as red wood, safflower, indigo, as well as the drugs and medicinal substances, borax and saltpetre. Of that important ship-building wood teak, we imported, in 1856, 16,500 loads. Coffee was now grown in Chota-nagpore, Malabar, Travancore, and Mysore, and about 4½ million pounds were now shipped. The average production of indigo in Jessore and other districts of Lower Bengal, was now over 100,000 maunds (of 74 lbs.), our imports from thence exceeding 71,000 cwts. A little indigo was grown in Scinde, and the culture of the plant could be extended to many other localities. Excellent tobacco was grown at Masulipatam, Rajmundry, Coimbatore, &c., although not in sufficient quantity to export. The production of opium in Patna and Benares, and in Malwa, had doubled within the last ten years. These were some of the indications of British enterprise and British industry which could not be overlooked. But the suggestions of Mr. Clarke would carry forward the work on a more rapid scale. The connection of healthy hill towns with the cities of the plains and the non-tropical districts, would necessarily draw residents to India, and give a guiding influence not only to tropical cultivation, but to the extension of our trade with Tartary and Thibet, &c., through Bhotan, Nepal, Cashmere, Ladak, &c., by the various mountain passes. Of this interior trade comparatively little was at present known, and yet, from various data he had consulted, exclusive of Tartary it could not be set down at less than a million and a half sterling.

While we were largely indebted in our trading operations for raw materials to India, a mutual exchange was being carried on. Maize, the potato, the capsicum, and many Western fruits had been introduced into India. The mahogany, logwood, pimento, and other important trees of the new world, were now spread over the whole country, while we had drawn from the Himalayas the valuable *Pinus deodara* and other trees and plants. The vine, the apricot, the raspberry, the strawberry, the olive, the carraway-seed, and other plants grew in wild luxuriance all over the Himalayas. Vines flourished on spots almost inaccessible; and the carraway seed, whose delicious fragrance was so highly prized in Asia, grew in places where, six months in the year, the snow lay deep, about 15,000 feet above the level of the sea. The late Dr. Royle, in his "Productive Resources of India," published twenty years ago, after enumerating the varied vegetable productions of that country, referred specially to the mountains, and remarked that "though their bases are covered with a tropical and unhealthy jungle, they abound in valuable woods, have at certain elevations a delightful climate, and productions analogous to European countries. There we may soon hope to see the tea plant a thriving culture, and the hemp turned to useful account. Also, though the cold and bleak tops of these mountains, and the plains on their northern face, appear barren and unproductive, their lakes abound with borax, and their valleys with vines; and we have in addition spikenard and rhubarb from the vegetable, with musk from the animal kingdom." Since these lines were penned, very much had been done, but much more remained yet to be accomplished. Indeed, to comprehend the diversities of so wide a field, to evolve its various natural resources and to display its manifold capabilities, was a task of no ordinary magnitude, but the benefits which might be insured were more than commensurate to the difficulties to be overcome, and if only ordinary precaution were taken in suiting our measures to the objects we had in view, every fresh step would afford an advanced position from which to make further progress, so as to afford facilities to the government and benefits to the people.

Mr. HENDERSON said that Mr. Hyde Clarke had guarded himself from the imputation of advocating the colonisation of India in the same sense as would be understood in reference to any of our other colonies, and had had recourse to the phrase "English settlement," for the purpose of avoiding the misapprehension occasioned by the first-named term. The reasons given by Mr. Clarke for this change of expression did not appear to be sufficiently precise. Colonisation in India, whether on the hill regions or elsewhere, must be understood in a different sense from what was usually implied. What was wanted for Canada, Australia, &c., was simply labour and capital; but in India it was not labour, but skill and integrity that were required. India already possessed more manual labourers, in most localities, than she was able to give continuous or profitable employment to. The population of India was sufficiently great to turn to account the whole productive resources of that country. What she required was brain, not muscle. She needed the seeing eye and the guiding hand—not the mere brute labour, which, after all, could be supplied by a colony of chained convicts. India was the field of colonisation for the educated middle classes of England, not for the hewers of wood and drawers of water. To lose sight of this distinction was to mistake the whole question. The position of Englishmen in India must of necessity be that of a governing class; *sahibs* (or masters), not labourers. India was no field for English labour; the climate and the superabundance of the population precluded its introduction into that country. The thing then to be considered was, how were Englishmen of the educated class to be kept in health in India, without having recourse to the expensive system of furlough to England. Mr. Clarke saw in the so-

lution of this problem a means of materially strengthening our hold on the Indian Empire, and very justly considered that whatever tended to such a purpose was well worthy of the attention of the people of England. To understand the difficulties in the way of establishing English settlements in India, it would be necessary to recur to the condition of the Indian Government some forty years ago, when he (Mr. Henderson) had first become acquainted with it. Previous to the year 1813, India had been sealed to all Englishmen not in the service of the East India Company. To obtain a licence to reside as a free merchant in the country, or even to enter any of her seaports as a free mariner, required as much influence and diplomacy as were now necessary to obtain a writership or a cadetship. At this time, almost the only commercial houses in India were either directly or indirectly under the management of the Company's servants, who took good care that interlopers should have no chance of competing with them. This was the era of the famous "pagoda tree," when fortunes were made in as many months as would now require years. In 1833, when the East India Company relinquished their monopoly of the China tea trade, the Indian Government also abandoned its mercantile character and the operations which they had commenced for the cultivation of tea in their own province of Upper Assam. The preliminary expenses of European supervision were undertaken by the Bengal Government for the first three years, when, on the formation of the Assam Company, the gardens and part of the establishment were transferred to it by the Bengal Government, the reports of their officers inducing the belief that a crop of two million pounds of tea would be obtained in seven years. The offer was accepted, the merchants of London and Calcutta establishing the Assam Company, with a capital of £500,000, of which £200,000 was speedily paid up, and invested in cleaning the land, granted free of rent for 20 years, and arrangements were made for the transmission of labourers from the lower provinces, two ships having been despatched from Singapore and Penang with 460 Chinese labourers, for the cultivation and manufacture of the tea. They also provided the Assam steamer, a model of which was on the table, and the Naga tow boat was constructed in Calcutta and despatched to Assam in 1840, carrying with her a saw mill. The difficulty, however, of procuring a steady supply of labour was very great, so that not one tithe of the crop anticipated was realised. A great loss was thus sustained, principally, however, from the scarcity of intelligent and energetic superintendents, and from the great mortality arising from the malaria engendered by the newly cleared forest. Had there existed at that time English settlements on the hill regions, or had adequate encouragement been given by government for emigration of the educated classes from England, there would doubtless have been little difficulty in procuring the necessary number of trustworthy superintendents. Mr. Clarke had very properly subordinated this idea of English settlements to that of improved means of communication throughout India. The railways now in progress of construction would no doubt, in the course of a few years, enable the different sanitaria and hill stations to be within easy access of the great centres of commerce and military operations; but, at present, the completion of these lines was delayed from want of adequate means for conveying the railway stores and material. The means hitherto available for this purpose were the steamers and other vessels plying on the great rivers, but the exigencies of Government, during the late crisis, had absorbed nearly the whole available means of water transport, and the railway operations had been seriously retarded. With the view of overcoming this difficulty, as well as providing for the means of communication to the eastward and southward of the Ganges, he (Mr. Henderson) had devised a system of steam tug and tow boats for general purposes, capable of being

managed by native crews, with or without steam power—models of which were on the table.

The CHAIRMAN proposed a vote of thanks to Mr. Hyde Clarke for his valuable and highly interesting paper, and expressed his regret that the time did not allow them to discuss this subject in a way that its importance deserved.

The Paper was illustrated by various maps, views, and photographs kindly lent by the East Indian Railway Company, the Madras Railway Company, the Oude Railway Company, Mr. Ewart, M.P., Mr. Wyld, M.P., Messrs. J. and C. Walker, Messrs. Kell, and Messrs. Maclure, Macdonald, and Macgregor. On the table were specimens of tea, contributed by the Assam Tea Company, and models of boats designed and lent by Mr. A. Henderson.

The Secretary announced that on Wednesday evening next, the 26th inst, a Paper by Mr. M. Digby Wyatt, "On the Influence Exercised on Ceramic Manufactures by the late Mr. Herbert Minton," would be read.

The following letter has been received by the Secretary:—

SIR,—Had other engagements permitted, I should certainly have accepted the invitation to take part in the discussion upon Mr. Hyde Clarke's paper.

As an auditor of Indian railways, I know how important an element of judgment is the financial and economical view of our Indian policy, and I venture to contribute a few considerations from that point of view.

So long as India could be regarded chiefly as a market for the sale of our wares, or for the supply of our wants, it was not within the power of the privileged corporation which Great Britain fostered, either to compromise the national honour or to commit the national resources. Now, however, that territorial rights and responsibilities have devolved upon us, and supreme government has come to be exercised on behalf of the Crown, we can no longer deal with our fellow subjects in a mere trading spirit; and if we were even warranted to consult our immediate convenience and abandon millions of our fellow men to the chaos which our rule alone prevents, we should nevertheless not dare so to debase Great Britain in the scale of nations, as to flee from that conspicuous post in the van of civilization.

How best to maintain India in peace is the question of the day. Does any observant man doubt that the rebellion might have been averted, even with the handful of European troops available at its outbreak, could railway enterprise, fostered in due season, have then afforded moderate facilities for the transit, distribution, or concentration of forces?

What an appalling picture were a balance-sheet, showing, on one side, the cost of the rebellion in blood, treasure, prestige, and progress; on the other side, the contingent responsibility in respect of a few hundred thousand pounds per annum of guaranteed interest upon railway capital during construction.

The debit side of such a balance-sheet will remain beyond the power of mere figures to express; the other side has been thus intelligently computed by the City Editor of the *Times*, a competent appraiser.

"The responsibility is simply a guarantee upon railways, and this, according to present experience, promises ultimately to be merely nominal, since the lines, while they will enormously increase the tax-paying power of the people, are likely, at the same time, to yield upon completion more than the rate of interest to which the government stand pledged."

It was a bolder policy which happily determined the

construction of telegraphs in India, and we have it on no less authority than that of Colonel Sykes, ex-Chairman of the East India Company, that the telegraph has been the salvation of our Indian empire, while it has also proved a commercial success.

The cry is still—more men from England! and we are told that 50,000 men are placed in India at a cost of £100 each, *i.e.*, five millions of pounds sterling! How instructive is the problem suggested thereby. Since these men must be relieved or replaced at short intervals, because of the ravages of climate and concomitant evils, what is the capital sum which, at market rates of interest, is equivalent to the recurring cost of these periodical reliefs or replacements? And what fragment of that capital sum would suffice to open up the proposed sanitary retreat in Northern Bengal, within a few hours rail of Calcutta, where, we are told, European troops might luxuriate in a genial atmosphere, and be maintained, within call, for effective service in all emergencies; if, indeed, all emergencies need be apprehended when the native mind shall become conscious of such resources in reserve.

If Indian enterprise, as an investment, did not happen to be associated in the public mind with the guarantee of a minimum dividend of 5 per cent. (not advanced out of capital as in other analogous cases, but contributed direct from the public treasury), there would be less disposition to weigh the security offered by the guaranteeing party, *i.e.* the solvency of the Government of India prospectively.

The present market price of Indian Railway Stock, contrasted with what it used to be when money was less abundant, before the rebellion, seems to present some anomalies.

1. Then, East India Railway Stock fetched £130 per cent.; the East India House, in Leadenhall-street, being the ostensible government, one which in popular estimation, might have been left in the lurch, and perhaps ejected from India; whereas now, the corporation is already virtually superseded by the Imperial Government, and the honour and resources of the whole empire are in the face of the world committed to the maintenance of our supremacy in India.

2. Then the line opened was not yet earning the outgoings in respect of it; whereas now, its rapidly developing traffic already yields 7 or 8 per cent. net profit.

3. Then, a constituency holding until 1874 a stake in India, represented by £6,000,000, exercised a certain influence to the exclusion of all others; whereas now, the railway proprietary, interested possibly for 99 years, to the extent of some £30,000, may rest assured that if any constituency shall hereafter have a voice in Indian affairs, to them will be recorded a due preponderance for the protection of their proper interests.

4. Then, the Imperial Government was a mere creditor in respect of such advances as occasion might require, whereas, hereafter, still larger advances from the Government, in one capacity to itself, under some other name or form, must unavoidably take rank in subordination to claims of simple creditors, especially guaranteed ones.

This fourth contrast, however, moots the hair-splitting question of the extent of Imperial responsibility, for the pecuniary engagements of the Indian executive, which it (the Imperial Government) has controlled, and is about to supersede. Deliberate opinions, from those of Peel in 1842, down to those of Gladstone, Disraeli, Baring, and other authorities in 1858, might be more usefully cited here if the question seriously affected Indian railway securities. What boots it, however, to discuss, whether a bill accepted by the Indian Government does or does not convey a claim "in need" upon the Imperial treasury, so long as 7 or 8 per cent. is available already, and the Imperial treasury is becoming more and more committed to the protection of the railway, a dividend paying highway, to an extent far in excess of the minimum of interest guaranteed.

Occasionally consulted upon the relative merits of investments, as such, my attention has been naturally directed to the swollen currents of floating capital, which continue to congest the ordinary channels, and prevent a healthy rise in the rate of interest. This is a common sequence of every monetary crisis, and unless a due appreciation be induced of legitimate British enterprise, we shall soon be drawn into a vortex of wild speculation, with its inflated promises and demoralizing results. Nay, even with reference to foreign governments, which find it expedient to pay dividends through good or through evil report, may we not demand whether the same capital, which, if buried in Russia or like soils, might, as in the fable, spring up armed men, must not, if employed in developing the magnificent resources of our own Indian empire, conduce to results at once conciliatory and civilizing, profitable and reproductive of occasions for profit, as well as conversive of what were else a drain upon our resources, into a noble element of the national strength.

I am, &c.,

J. A. FRANKLIN.

9, Warrford court, 17th May, 1858.

SOUTH KENSINGTON MUSEUM.

During the week ending 15th May, 1858, the visitors have been as follows:—On Monday, Tuesday, and Saturday (free days), 4,098; on Monday and Tuesday (free evenings), 4,262. On the three Students' days (admission to the public 6d.), 924; one Students' evening, Wednesday, 136. Total, 9,420.

Home Correspondence.

THE SEWAGE QUESTION.

SIR,—As an exhibitor of new apparatus at the Society of Arts, to manage and utilise sewage on a new principle, I was anxious, at the last meeting of the Society, to draw attention to the model on the table, and several drawings illustrating its principles and mode of operation. I was, however, so satisfied with the turn the discussion was taking—tending to show that the whole system at present rests upon wrong principles—that I contentedly waited until it was too late to enter upon anything like a clear explanation.

In opening the discussion, Lord Ebury remarked upon the unsettled and unsatisfactory state in which the whole question was still left, after the last as well as all the reports and investigations on the subject, noticing particularly the term employed by Mr. Baker, the reader of the paper, to the effect that we were still “hammering at” a plan. Most of the succeeding speakers took much the same view, complaining that there was nothing to “go upon” in the new Report of the Royal Commission, and that the whole question required to be discussed and examined again *ab initio*, in which I fully agree.

Another observation made by his lordship touches, I think, upon the very point upon which the re-discussion should take place.

In explaining the reasons why the nuisances so much complained of had not been more rapidly and successfully abated, he observed, that until even a recent period the duties of the authorities were strictly “to prevent all sewage matter from getting into the sewers,” and not to consider how best to send it through them. Now it is to this point, I think, we must return at last; in fact, to the consideration of whether this great change was a wise and beneficial alteration or not. *Nulla vestigia retrorsum* may be a good motto in heraldry, but in more practical matters it is a very dangerous one; in all cases when a false move has been made, the sooner it is backed out of the better, according to all experience.

Now, I am perfectly convinced, and have been so for some time, that a gross error was committed in that change. With all its *désagrémens*, I think it was at least a safer plan than the present one, which indeed seems to be attended with quite as much nuisance, and is certainly more complained of, and that not without reason. If, however, it can be shown that all the inconvenience and nuisance attending the removal of house-refuse can be easily and completely avoided, and even the trouble of it reduced to a mere nothing, the objections to a return to the old plan ought, in reason, to be considered as removed.

In a paper read before the British Association last year (but which there was no time to discuss), I endeavoured to prove that position, and I have since re-examined the whole subject very carefully. That paper is now published,* and all the apparatus necessary and proved to be effectual and easy of application for the purpose, may now be seen at the Society's Exhibition.† Many details of the plan no doubt remain yet to be filled up, but I believe the great principles of it have been made out, and indeed it has been proved to act satisfactorily in practice.

I am, &c.,

J. LLOYD, M.D.

Anglesea, May 17th, 1858.

MR. SANDERSON'S PAPER ON IRON.

SIR,—In reading my paper perhaps some misapprehension may arise as respects the reduction of the metalloids and the discharge of the phosphoric acid; the rationale is this—sulphate of iron being used as the flux, the oxygen of the sulphuric acid, and probably that of the protoxide of iron also, or a part of it, unites with the carbon in the pig iron, and with the metalloids, oxidising the latter into their earths, the sulphur into sulphurous acid, and the phosphates into phosphoric acid, the carbon becomes carbonic oxide or carbonic acid, most probably both, the sulphurous acid goes off in fumes, and the earths due to the oxidized metalloids pass with the phosphoric acid into the cinder. The phosphoric acid has by accident been described as volatile, at least the paper may be so understood; this, however, it is not.

I am, &c.,

CHARLES SANDERSON.

Sheffield, May 18, 1858.

Proceedings of Institutions.

HALIFAX.—The last report of the Mechanics' Institution, read at the annual meeting, at which John Crossley, Esq., presided, states that the number of members and subscribers amounts in the aggregate to 1,299, showing a large increase upon that of last year. The number of volumes added to the library, during the year has been 368, the total number being 4,285. The issues during the same period have been, of volumes, 15,275; periodicals, 3,230—total, 18,505, being an increase over the previous year of 5,525. Lectures of a superior character had been provided, but which, however, had not been very well attended. The lectures of John Abbott, Esq.; H. Phillips, Esq.; John Stores Smith, Esq.; the Rev. E. Mellor, M.A.; J. D. Hutchinson, Esq.; and the Rev. R. L. Carpenter, B.A., were all gratuitous, and to those gentlemen the best thanks of the Institution were due. The additional class accommodation provided had been fully occupied by fresh applicants for admission to the classes, on removal to the new premises. In order to perfect their organisation much time had been spent, and a large expenditure incurred, each class-room having been supplied with the appropriate school requisites. The benefit arising to the pupils by this outlay was already

* Engineer Office, No. 163, Strand.

† See No. 229 in the Catalogue.

perceptible, and the classes were now in an efficient condition. In order to sustain this, a considerable portion of the income of the Institution must be spent in this department. The average attendance of the classes on each evening for the year is 132. The Rev. Mr. Carpenter, Mr. Lewthwaite, and Mr. H. Foster, are gratuitous teachers. The number on the books of the female branch is, adults, 50; juveniles, 73—total, 123. These classes are taught gratuitously by Mrs. Carpenter, the Misses Stansfeld, and Miss Birtwhistle. The average attendance of the juveniles is 35, and the aggregate attendance of adults and juveniles has frequently exceeded 80. The success of the penny savings bank had outstripped the most sanguine expectations of the directors; the amount of deposits paid in during the last six months being £1,643 10s. 6½d., and the amount of interest allowed, £28 16s. 9d. The present number of pass-books out is 4,167, and there are no fewer than 3,100 open accounts. Notwithstanding the munificent donations made to the Building Fund, there is still a considerable debt remaining upon the Institution, but the directors observe that seldom has there been such a cordial union of all parties in the community to recognise the claims of a public Institution; and seeing that, to such a large extent, public sympathy has been enlisted, they do not despair of the entire removal of the debt at no very distant period.

MEETINGS FOR THE ENSUING WEEK.

- MON.**Geographical, 1. Anniversary.
 Linnæan, 1. Anniversary.
TUES.Royal Inst., 3. Mr. J. P. Lacaita, "On the History of Italy during the Middle Ages."
 Meteorological, 7. Anniversary.
 Med. and Chirurg., 8½.
 Civil Engineers, 9. President's Conversazione.
WED.Geological, 8. Mr. Harkness, "On Jointings and Dolomites near Cork." Mr. Prestwich, "On the Westward Extension of the Raised Beach of Brighton." Dr. Bigsby, "On the Palæozoology of the Strata of New York."
 Society of Arts, 8. Mr. M. Digby Wyatt, "On the Influence exercised on Ceramic Manufactures by the late Mr. Herbert Minton."
 Archaeological, 8½.
THURS. ...Numismatic, 7.
FRI.United Service Inst., 3. Lieut.-Col. E. Wilford, "On the Qualifications necessary for an Infantry Soldier efficiently to use highly-improved modern Fire Arms."
 Royal Inst., 8½. Dr. E. Frankland, "On the Production of Organic Bodies without the Agency of Vitality."
SAT.Royal Inst., 3. Dr. Lankester, "On the Vegetable Kingdom in its relations to the life of man."
 Medical, 8.

PARLIAMENTARY REPORTS.

PRINTED SESSIONAL PAPERS.

- Parl. No.**
 76. Bills—Bishops' trusts Substitution.
 77. —Ecclesiastical Corporations Leasing.
 Statistical Abstract for the United Kingdom, from 1843 to 1857.
Delivered on 8th and 10th May, 1858.
 161. Civil Contingencies—Account and Estimate.
 182. Oxford University—Copies of Four Ordinances.
 183. Oxford University (Scholarships of Lord Craven's Foundation)—Copy of an Ordinance.
 242. Irish Mail Contract Vessels—Return.
 250. Poor Relief (Ireland)—Return.
 252. Education—Return.
 256. Navy—Return.
 258. Barracks (Metropolis)—Return.
 264. Probate Duty—Return.
 265. East India (Oude)—Copies of Letters and Proclamation.
 267. Victoria Station and Pimlico Railway Bill—Return.
 269. Public Works (Ireland)—Account.
 264. Straits of Malacca—Copies of Correspondence.
 191. Education—Paper.
 78. Bills—Ecclesiastical Residences (Ireland).
 75. —Oxford and Cambridge Universities, &c., Estates.
 Sewage of Towns—Preliminary Report of the Commissioners.
Delivered on 11th May, 1858.
 73. Bill—Sale and Transfer of Land (Ireland).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, May 14, 1858.]

- Dated 8th March, 1858.*
 466. B. B. Stoney, Dublin—Imp. in buoys, floating beacons, and other similar floating b. dies.
Dated 17th March, 1858.
 542. W. S. Clark, Atlas Works, Upper Park-place, Dorset-square—Imp. in metallic canisters for holding gunpowder and other articles of a similar nature. (A com.)
Dated 24th March, 1858.
 624. A. L. Thirion, Alsche-en-Retail, Belgium—An improved method of transforming circular movements.
Dated 15th April, 1858.
 816. F. S. Thomas, Junction-street, Kentish-town—An improved mode of propelling carriages upon railways.
Dated 20th April, 1858.
 863. W. S. Clark, Atlas Works, Upper Park-place, Dorset-square—An improved cultivator tooth for agricultural purposes. (A com.)
 864. R. Peacock, New Holland, Lincolnshire—Imp. in apparatus for preventing smoke in furnaces, and in effecting a more perfect combustion of fuel.
Dated 22nd April, 1858.
 881. T. Hutchison, Paisley—Imp. in shawls.
 885. G. Smith, Morriston, near Swansea, Glamorganshire—Imp. in the manufacture of zinc. (A com.)
 887. P. Maugey, Paris—Imp. in diaphragms for optical instruments. (Partly a com.)
 888. H. A. de Saegher, Brussels—A composition proper to prevent the incrustation of steam boilers.
 889. W. Beck, New York—Improved machinery for weaving fringes and other fabrics. (A com.)
 891. T. Harrington, Dover—Improved mode of ventilating the hold and other parts of ships.
 892. J. B. Paddon, Gray's inn-road—An imp. in gas regulators.
 893. J. Stocks, Berry Brow, and Charles Kave, Lockwood, Yorkshire—Imp. in apparatuses for coupling and uncoupling wagons and carriages on railways.
 894. T. Donkin, Bermondsey—Imp. in apparatus employed in the manufacture of paper, applicable also to controlling the motion of travelling webs and fabrics. (A com.)
Dated 23rd April, 1858.
 895. T. Greenshields, 11, Little Fitchfield-street—Imp. in purifying gas produced from coal, and obtaining ammoniacal and other alkaline salts.
 897. C. Atkinson, Sheffield—A certain imp. in Venetian blinds.
 898. H. J. Sillem, Liverpool—Imp. in the machinery for the manufacture of sugar.
 899. J. P. Pirsson, New York, U.S.—Imp. in the condensers of steam engines.
 900. W. Foster, Black Dike Mills, near Bradford—Imp. in multi-tubular and other boilers for the prevention of smoke and economising fuel.
 901. A. Jenkin, Carrick Mines, Dublin—Imp. in furnaces for the reduction and calcination of lead, tin, and copper ores.
 902. J. O. York, Paris—Imp. in obtaining power when bi-sulphuret of carbon is used. (A com.)
 903. C. Lungley, Deptford Green Dockyard—Imp. in the construction of portable ships and boats, and their appurtenances.
Dated 24th April, 1858.
 905. J. Maitre, Thieffrain (Aube), France—Proper apparatus for washing iron mineral.
 907. R. Bodmer, 2, Thavies-inn, Holborn—An improved apparatus for removing sand and similar loose material from docks, rivers, and waterways. (A com.)
 908. F. Lillywhite and J. Wisden, Coventry-street—An improved apparatus for projecting cricket balls, or other similar articles.
 909. W. A. Clark, Bethany, U.S.—Imp. in expansive bits.
 910. J. Horton, Ashburton—An improved construction of horse-hoe.
 911. J. Lawson, Leeds—Imp. in machinery used in spinning flax and other fibrous substances. (Partly a com.)
Dated 26th April, 1858.
 912. L. Newton, Oldham—Imp. in cop tubes used in spinning machinery.
 913. B. Burleigh and F. L. Danchell, Great George street, Westminster—Improvements in filters.
 914. J. M. Fisher, Taunton—Imp. in chimney tops or cowls.
 915. J. Braidwood, Glasgow—Imp. in steam boilers and furnaces.
 916. J. Westcoby, Huddersfield—Improved apparatus for lubricating pistons.
 917. W. Jones, Pendleton, Lancashire—Improved machinery for ringing bells.
 920. J. Seaman, Britannia Iron Works, Bedford—Imp. in machinery or apparatus for effecting the working or cultivation of land, and in the means of driving the same.
 921. W. Foster, Lower Tower-street, Birmingham—An improved vent-tap.
 922. E. E. Lee, Birmingham—Certain improved modes of applying vitrifiable materials for the ornamentation of metal, buttons, clasps, and other articles of dress, and which said improvements are also applicable to the ornamenting of gilt-jewellery, book-clasps, and mounts, also parts of lampstands, chandeliers, and other such like articles made in dies, moulded, or formed in any other way.

923. T. Dobson, Birmingham—Imp. in machinery or apparatus for forging iron.
924. W. E. Newton, 66, Chancery-lane—Imp. in covering roofs and other parts of buildings with slate or other materials. (A com.)
Dated 27th April, 1858.
925. E. Hunt and H. D. Pochin, Salford—Imp. in the treatment and application of resins and resinous substances.
926. E. White, Bath—Imp. in facilitating reference by means of indexes.
927. E. Simons, Birmingham—Imp. in cornices and cornice poles for window and other curtains.
928. C. F. Vassero, 45, Essex-street, Strand—Imp. in the arrangement and construction of blast-engines, pneumatic machines, and pumping engines generally. (A com.)
929. J. Fraser, Blue Vale Chemical Works, Gallowgate, Glasgow—Imp. in the manufacture of nitrate of potass.
931. G. R. Tovell, Mistle, Essex—Imp. in the construction of ships and other vessels.
933. M. Moss, 15, Marlborough-place, Old Kent-road—Imp. in ladies petticoats.
934. J. Hulett, Aldersgate-street—An imp. in shirt collars.
935. M. Sautter, Paris—A new and useful imp. in diving bells. (A com.)
936. W. Keiller, Dundee, N.B.—Imp. in apparatus for cutting, reducing, or dividing vegetable, animal, and other substances.
937. W. E. Newton, 66, Chancery-lane—Imp. in machinery for splitting leather or skins. (A com.)
939. J. F. M. Charpentier, 39, Southampton-row, Russell-square—A fire escape.
Dated 28th April, 1858.
940. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved apparatus for the condensation of smoke. (A com.)
941. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved saponaceous compound. (A com.)
942. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved process for combining silk with other textile substances. (A com.)
943. B. Martin and C. J. Light, Great George-street, Westminster—Imp. in railway turntables.
944. E. Tomlinson, Manchester—Imp. in cop tubes, and in the machinery or apparatus to manufacture the same.
945. C. F. Vassero, 45, Essex-street, Strand—An improved waterproof fabric. (A com.)
946. W. Clark, 53, Chancery-lane—Imp. in railway crossings. (A com.)
947. A. V. Newton, 66, Chancery-lane—Certain imp. in the construction of paddle-wheels. (A com.)
949. A. Winkler, Vienna—Imp. in printing or producing impressions in gold, silver, and oil-colours upon metallic plates, and in the mechanism employed therein.
950. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in furnaces for the melting and reduction of steel, copper, zinc, and other metals. (A com.)
Dated 29th April, 1858.
951. J. Martin, Barmer, near Fakenham, Norfolk—Imp. in machinery or apparatus for reducing, cutting, or pulping roots and other substances.
952. S. Bartlett, 135, Lupus-street, Pimlico—Imp. in machinery for forming gutta percha soles and uniting them to the upper leathers of boots or shoes. (A com.)
953. E. Simons, Birmingham—Imp. in ordnance.
954. A. M. Perkins, Francis-street, Gray's-inn-road—Imp. in high-pressure steam engines.
955. C. Lawrence, Honley, near Huddersfield—Imp. in steam engines.
956. R. Johanny, Vienna—Imp. in the construction of furnaces.
957. W. Smith, 18, Salisbury-street, Adelphi—Imp. in spinning machinery. (A com.)
959. D. Auld, Glasgow—Imp. in working furnaces and steam boilers, and in apparatus connected therewith.
Dated 30th April, 1858.
960. R. B. Huygens de Lowendal, 59, Chancery-lane—Imp. in the construction of springs, and for their new application to the working of machinery.
961. J. Chadwick, Manchester, A. Elliott, West Houghton, Lancaster, and W. Robertson, Manchester—Imp. in machines for twisting and winding silk direct from the cocoons, such machines being of the class commonly known as throstles.
962. J. Luis, 15, Welbeck-street, Cavendish-square—Proper apparatus for separating two substances of different densities; among others may be mentioned pit coal from the slate which it contains. (A com.)
963. B. E. Guyot de Brun, Pantin, Rue de Montreuil, 18, Seine, France—Leather tissue and other tissues rendered waterproof by a new process.

965. E. T. Hughes, 123, Chancery-lane—An improved regulator and float combined applicable to the manufacture of paper. (A com.)
966. J. C. Faucon, Paris—Imp. in bedsteads, bed bottoms, seats, and articles for lying and reclining on.
967. J. Chapman, jun., North Foreland Lighthouse—Producing a substance entitled felted-woody-fibre, convertible into useful articles, and applicable to the internal fittings and decorations of dwelling-houses.
968. G. H. Ellis, New Malton, Yorkshire—Imp. in cleaning boots and shoes by machinery, and in apparatus for the same, which is also applicable to cleaning other articles in domestic use.
969. W. Clark, 53, Chancery-lane—Imp. in obtaining motive power, and in the apparatus connected therewith. (A com.)
970. P. A. Godefroy, 3, King's-mead-cottages—Imp. in the mode of separating vegetable from animal fibres or fabrics.
971. C. A. J. Demanet, 43, Rue de la Science, Brussels—The extraction of coals and minerals from mines.
972. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in suspension bridges. (A com.)
973. A. Smith, Mauchline, Ayr, N.B.—Imp. in valves.
Dated 1st May, 1858.
975. R. Wardell, Stanwick, near Darlington—Imp. in reaping machines.
976. R. Illingworth, Blackburn—Imp. in safety valves.
977. W. Spence, 50, Chancery-lane—Imp. in the production and application of a material called French purple, and in the process employed in obtaining it. (A com.)
978. L. Talabot, 57, Rue de la Chaussée d'Antin, Paris—Imp. in rolling railway and other bars.
979. W. Hopkinson and J. Dewhurst, Mayfield Printworks, Manchester—Imp. in apparatus for consuming smoke.
980. F. M. Gregory, Shavington, near Market Drayton—Imp. in chair-cutting machines.
Dated 3rd May, 1858.
982. C. Schleicher, Bellevalle, Prussia—An improved machine intended to make the points of needles, pins, and all other similar articles.
984. E. S. Trower, Stansteadbury, near Ware, Herefordshire—Imp. in apparatus for treating flax, hemp, and other fibrous matters requiring like treatment.
986. J. G. Appold, Wilson-street, Finsbury-square—Improved apparatus for laying submarine telegraphic cables.
Dated 4th May, 1858.
988. J. Smethurst, Guide Bridge, Lancashire—Certain imp. in boilers for generating steam.
992. W. E. Newton, 66, Chancery lane—Improved apparatus for mixing and moulding materials for the manufacture of fuel, parts of which apparatus are applicable to moulding bricks and other analogous articles. (A com.)

WEEKLY LIST OF PATENTS SEALED.

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| <i>May 14th.</i> | 118. J. Brown. |
| 2864. G. P. Wheeler. | 342. J. Davis. |
| 2866. J. Macintosh. | 474. J. E. Poynter. |
| 2874. J. F. Spencer. | <i>May 18th.</i> |
| 2878. W. Gosage. | 2895. M. Booth and J. Farmer. |
| 2881. W. Pidding. | 2906. W. Clay. |
| 2884. R. A. Brooman. | 2915. C. L. West. |
| 2885. R. A. Brooman. | 2918. H. Walker, J. Beaumont, |
| 2888. W. H. Bell. | and J. Gothard. |
| 2892. A. F., F. O., & J. Germann | 2920. P. A. Brusaaut. |
| 2894. R. Clegg. | 2927. J. M. A. E. Fabart. |
| 2904. W. Clay. | 2943. R. W. J. Abbott and D. |
| 2950. W. Blinkhorn. | Mills. |
| 2956. W. B. Taylor. | 2959. W. Elcock and S. Bentley. |
| 2980. J. B. Couy. | 3019. T. S. Adshead and A. |
| 3024. W. E. Newton. | Holden. |
| 3066. C. Cowper. | 527. J. S. Russell. |
| 3038. J. Thornton. | 561. A. A. Croll. |
| 3102. H. Johnson. | 593. J. Biggs and W. Biggs. |
| 3170. J. H. Johnson. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

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| <i>May 10th.</i> | <i>May 12th.</i> |
| 1062. J. H. Johnson. | 1070. G. Robinson. |
| 1063. J. Steele. | 1083. W. Robertson. |
| 1115. J. G. Butt & J. A. Martin. | 1089. J. Mason, S. Thornton, and |
| 1134. T. Piggott. | L. Kaberry. |
| <i>May 11th.</i> | 1123. E. Morewood & G. Rogers. |
| 1091. R. S. Newall. | <i>May 13th.</i> |
| 1098. W. Fawcett, J. Lamb, and | 1085. R. McConnell. |
| F. B. Fawcett. | 1087. J. Buchanan. |

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
4088	May 18.	Portable Combination Chair Stool, &c.....	Levi Stead.....	97, Norton street, W.
4089	,, 19.	Fruit and Blossom Protector	Joseph F. Meston	Mundford, Norfolk.